DOMESTIC ENGINEERING

Whole Number 139 *Chicago and New York, May Fifteenth, Nineteen Hundred and One* *Vol. 21, No. 2*

NEW YORK, BOSTON, MINNEAPOLIS, DENVER, PHILADELPHIA, ST. LOUIS, LONDON, HAMBURG **AMERICAN RADIATOR CO.** GENERAL OFFICES LAKE & DEARBORN STS. CHICAGO.

DON'T SWEAR
USE OUR INCANDESCENT MANTELS IN 1901
Harding Incandescent Co.
HARDING BLDG.
CHICAGO.

PATTERNS
GOBEILLE PATTERN CO. Cleveland, O.

BUFFALO FORGE COMPANY
Disc Wheels
Pulley - Steam - Electric
FOR
EXHAUST VENTILATING & COOLING
Buffalo Forge Co., Buffalo, N.Y.

The Pattern Shop of the East
H. B. OLMSTEAD & CO.
87 FRANKFORT ST NEW YORK

F. E. Cudell's
PATENT
sewer gas and back-water **trap**

S+S+S R. B.

for wash bowls, sinks, bath and wash tubs

Put into the White House by the U. S. government. For venting use vent trap.

CLEVELAND, OHIO

Mantle Chemicals
The Roessler & Hasslacher Chemical Co.
Office: 100 William St., New York.
Chicago Office: 16 N. Clark Street.

WATER BIG SUPPLY VOLUME LIFTS
L. E. RHODES CO.
HARTFORD, CT.

See our Advertisement...Page 77

WHAT A DIFFERENCE
In the quality of Plumbing work.
RAYMOND'S

COMBINATION FERRULES MAKE RELIABLE CONNECTIONS BETWEEN LEAD AND IRON PIPES.

WHY?

Because they have an extra thickness of lead over the shoulder, giving strength where it is needed, and where other Lead Ferrules are weak.

The genuine article bears our label.

RAYMOND LEAD COMPANY, CHICAGO.

SEE ADV. ON PAGE IV
Paragon Boiler
ISAAC A. SHEPPARD & CO., - PHILADELPHIA

MICA INSULATING JOINTS
GAS, ELECTRIC AND COMBINATION FIXTURES
J. L. OEFINGER MFG. CO.
14 N. CANAL ST. CHICAGO, ILL.

'96 JENKINS' '96. SHEET PACKING
Pronounced by steam users throughout the world the best joint packing manufactured. Expensive? Not at all, as it weighs 30 per cent. less than many other packings; consequently is much cheaper.
JENKINS BROS., N. Y., Boston, Phila., Chicago.

Constructed under the Jewell Warren Continental & Hyatt Patents
GRAVITY AND PRESSURE FILTERS
WRITE FOR CATALOGUE
New York Continental Jewell Filtration Company
40-42 W. Quincy St., CHICAGO. 15 Broad St., NEW YORK.

MASONIC TEMPLES
Odd Fellows Halls, and all other buildings of fraternal societies contain assembly rooms which can best be lighted by my cluster reflectors, made in a large variety of styles and sizes. Special fixtures made to order.
I. P. FRINK, 551 Pearl St., N. Y. City

EXPORT TRADE

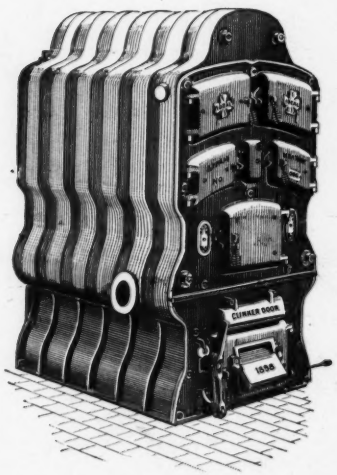
Every manufacturer interested in export trade should read the **"Foreign Trade Opportunity"** department in our Weekly edition.

LIBRARY OHIO STATE UNIVERSITY

"Things small, but significant, soon become important."

We feel that the many little important improvements made in

our 1901 line



of Ideal Boilers will strengthen and continue the high regard in which they are held by those who appreciate the fine points in boiler construction. May we furnish you our latest descriptive catalogue and prices?

AMERICAN RADIATOR COMPANY

Lake and Dearborn Streets

CHICAGO

NEW YORK
BUFFALO
MINNEAPOLIS

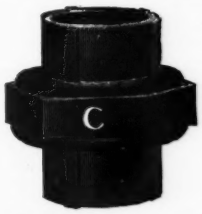
PHILADELPHIA
ST. LOUIS
DENVER

CRANE FITTINGS

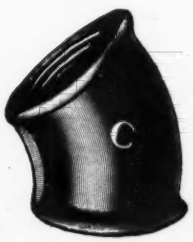
CRANE CO. CLAIMS NOT ONLY TO MAKE A LARGER NUMBER AND VARIETY OF FITTINGS THAN ANY OTHER MANUFACTURER, BUT ALSO TO CARRY A LARGER STOCK. ALL ARE THREADED TO A UNIFORM GAUGE. CRANE FITTINGS ARE MARKED WITH A "C"

POCKET CATALOGUE ON REQUEST

MALLEABLE IRON AND



BRASS PATTERNS



CRANE CO.

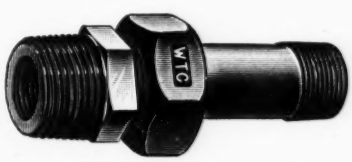
CHICAGO

ESTABLISHED 1855

NEW YORK
PHILADELPHIA
CINCINNATI
KANSAS CITY

OMAHA
SIOUX CITY
ST. PAUL

ST. LOUIS
LOS ANGELES
SAN FRANCISCO
PORTLAND, ORE.



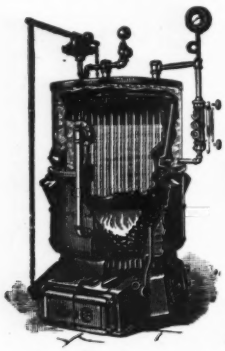
The "Kewanee" Boiler Coupling

BRASS and Iron Ball Joint Coupling. The coupling is brass, the ring and bottom piece malleable iron galvanized.

A coupling having all the advantages of a connection requiring no gasket to make a tight seal—besides a screw joint of different metals, thereby non-corrosive. The feature of an iron ring screwed to brass makes it possible to disconnect without injury to the ring.

WESTERN TUBE COMPANY

KEWANEE, ILL.



Hard Coal Boiler.

The Gorton Side Feed Boilers

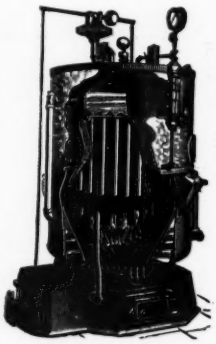
You want the best, We have it.

FOR STEAM AND HOT WATER HEATING.

Send for Catalogue and Investigate for Yourself.

96 Liberty Street, New York. Old Colony Bldg. Chicago.
77 Oliver Street, Boston, Mass. Prudential Bldg. Atlanta, Ga.

GORTON & LIDGERWOOD CO.



Soft Coal Boiler.

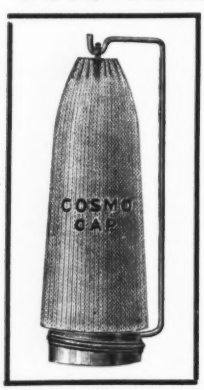
NO CHAIN IS STRONGER

than its weakest link. There are no weak spots in the **Paragon Boilers.** From top to bottom, from right to left, from front to back, each one is perfect and complete. The one peculiar feature about the boiler is the very moderate price at which it is sold.

ISAAC A. SHEPPARD & CO.

New York Philadelphia Baltimore

TROUBLE WITH YOUR LIGHTS? NOT IF YOU USE



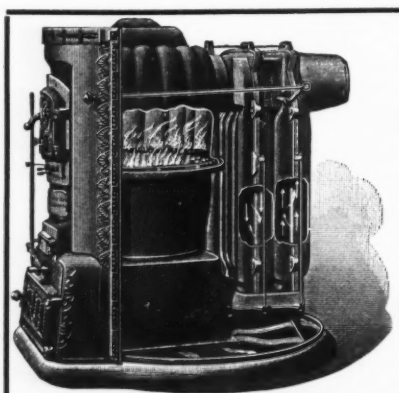
Cosmo Cap Mantle

Needs No Adjusting. Fits Any Incandescent Burner.

For Sale at all dealers **PRICE, 25 CENTS** Made by the

Cosmopolitan Incandescent Gas Light Co.

170 EAST MADISON STREET, CHICAGO



BENGAL FURNACE

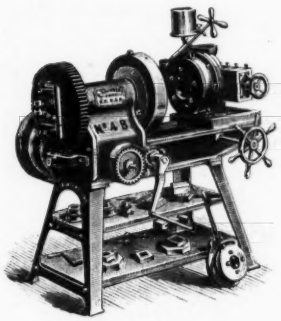
THE WONDER OF 1901 **IT HAS NO COMPETITOR**

DON'T KICK if your delay in securing the Agency for this Furnace has enabled the other fellow to get it. This is the opportunity of your life to secure the sale of the Best and Most Popular Furnace Made. The Bengal does the work, saves fuel, satisfies the customer, heats the house and NOT the chimney.

FLOYD, WELLS & CO., ROYERSFORD, PA.

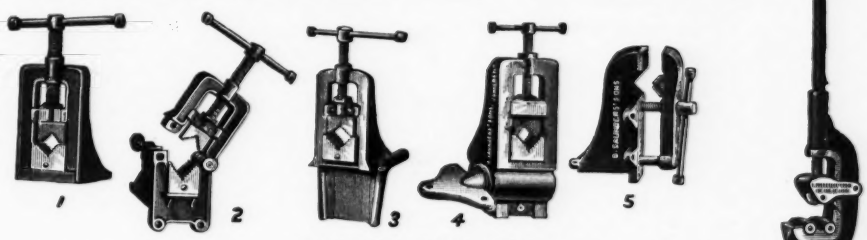
EASTERN SELLING AGENTS,

GURNEY & CO., WASHINGTON, HANOVER, & ELM STS., BOSTON, MASS.



No. 4 B. Pipe Cutting and Threading Machine, ½-inch to 4 inches. Hand or Power.

D. SAUNDERS' SONS

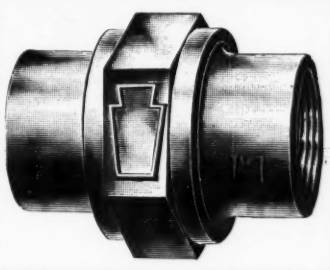


Manufacturers of Improved **PIPE VISES** of all Styles and Sizes

Holding one-eighth to eight inch pipe, made of malleable iron cast iron and steel. Also **Pipe Threading Machines ⅛ to 16-inch**; Hand Pipe Cutters, Stocks and Dies, Tapping Machines, etc.

SEND FOR CATALOGUE. **35 ATHERTON STREET, YONKERS, N. Y.**

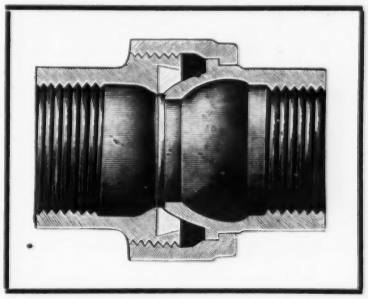
KEYSTONE UNIONS



Malleable Iron,
WITH
SOFT METAL SEAT
Are Always Tight.

MANUFACTURED BY

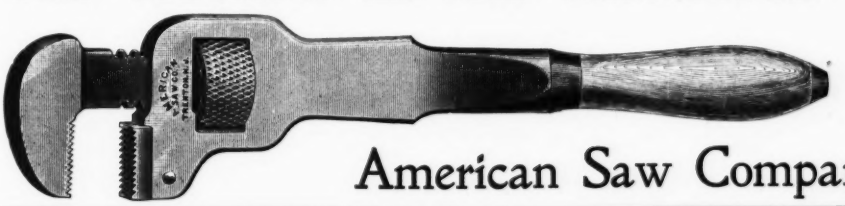
Stanley G. Flagg & Co.
NEW YORK PHILADELPHIA



The Two Great Wrenches

THE "TRIUMPH" and THE "ALLIGATOR"

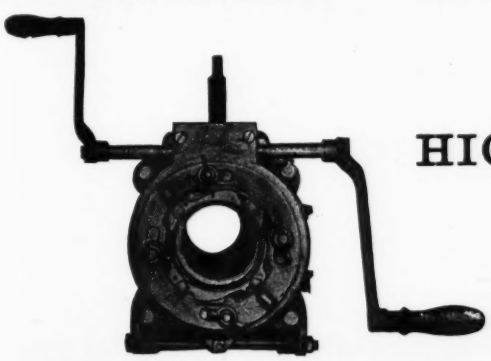
The Original. Always ready.
The Reliable. Always positive.
The Genuine. Never slips.



Never loses its grip or its handle.
Never crushes or locks on the pipe.
Can be used as a monkey-wrench or pipe-wrench.
Write for circulars and prices and mention DOMESTIC ENGINEERING

American Saw Company, Trenton, N. J.

Combination Vise and Screw Cutting Machinery

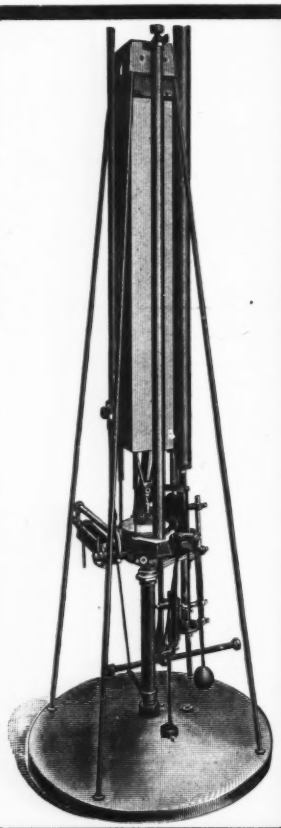


SAVES TIME AND MONEY
SEND FOR CATALOG AND PRICES

HICKMAN-MELHORN COMPANY
200-208 Liberty Avenue, PITTSBURG, PA.

SELLING AGENTS.

Strong, Carlisle & Hammond, Cleveland, Ohio.
National Supply Co , Toledo, Ohio.
A. Harvey's Sons Mfg. Co., Detroit, Mich.
James B. Clow & Son, Chicago, Ill.
The Robert Rom Co., Milwaukee, Wis.
M. M. Buck Mfg. Co., St. Louis, Mo.
Knight & Jillson, Indianapolis, Ind.
Ben. D. Potts, Columbus, Ohio.
The Law Co., New York, N. Y.
Cuyler & Mohler, Baltimore, Md.



"The light so bright that birds will sing and say it is not night."

Agents Wanted

To Handle the

U.L. Generator

Generating from 1 to 50 lights of 100 candle power. Lights may be turned on or off in any room on any floor like gas jets. Automatic, self regulating generator.

Price, $125.00

Liberal Discounts to Agents. For Terms and Territory address

Universal Light Co.

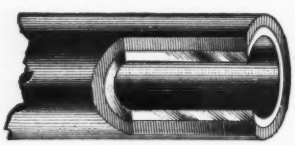
26-28 North Canal Street Chicago, Illinois

Simple and Safe

No Competitors

A Big Money Maker

Gasoline Tank may be placed 100 feet from Generator



L.&R. Patent Pipe

Tin-Lined Iron Pipe for Pure Water

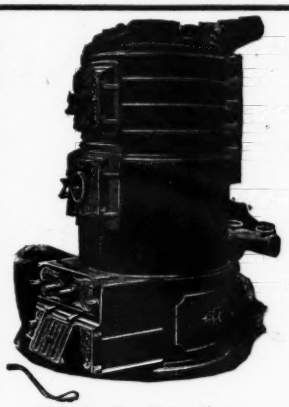
Cheaper than brass, about as cheap as lead, and SAFE
No brass or lead poisoning

SOLID. The Lining CANNOT BE SEPARATED from the Pipe even by Bending or Hot Water.

ALSO LEAD-LINED IRON PIPE MADE THE SAME WAY

LAMB & RITCHIE

CAMBRIDGEPORT, MASS.



400 Series Hot Water Heater.

Doric Hot Water Heater.

EVERY EFFORT COUNTS

If you expect to be successful you must expend your effort on a worthy object. It is useless to attempt to sell more heaters if those you've already placed fail to fulfill expectations. For such effort is wasted effort.

There is, however, a decidedly better way, namely, to push

"GURNEY"

...HEATERS...

For then you're handling a heater worthy of your best efforts. The "Gurney" Heater will do everything we claim for it, for the simple reason that we have constructed it so that it should attain just that end.

Naturally, it's profitable to handle, not only because each sale affords a satisfactory margin, but more so because each "Gurney" placed is the spokesman for several other sales.

We're always on the lookout for energetic agents, for dealers who are anxious to make more money than they are now making. Does that mean you? Then write us. Latest trade catalogue on request.

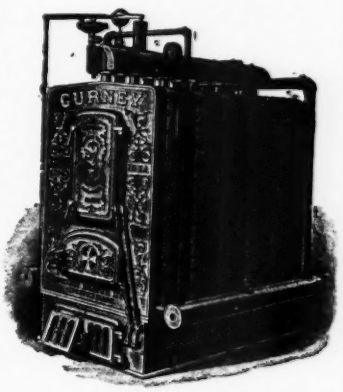
Gurney Heater Mfg. Co.

74 Franklin Street, Boston.

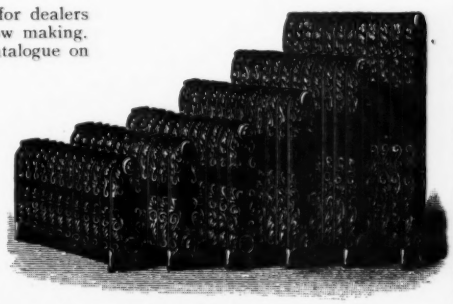
111 Fifth Ave., New York.

WESTERN SELLING AGENTS,

Jas. B. Clow & Sons, 222 to 224 Lake Street, Chicago, Ill.



Bright Idea Steam Boiler.



Duet Radiators for Hot Water and for Steam.

NEVERBREAK SECTIONS

HENDERSON HEATERS

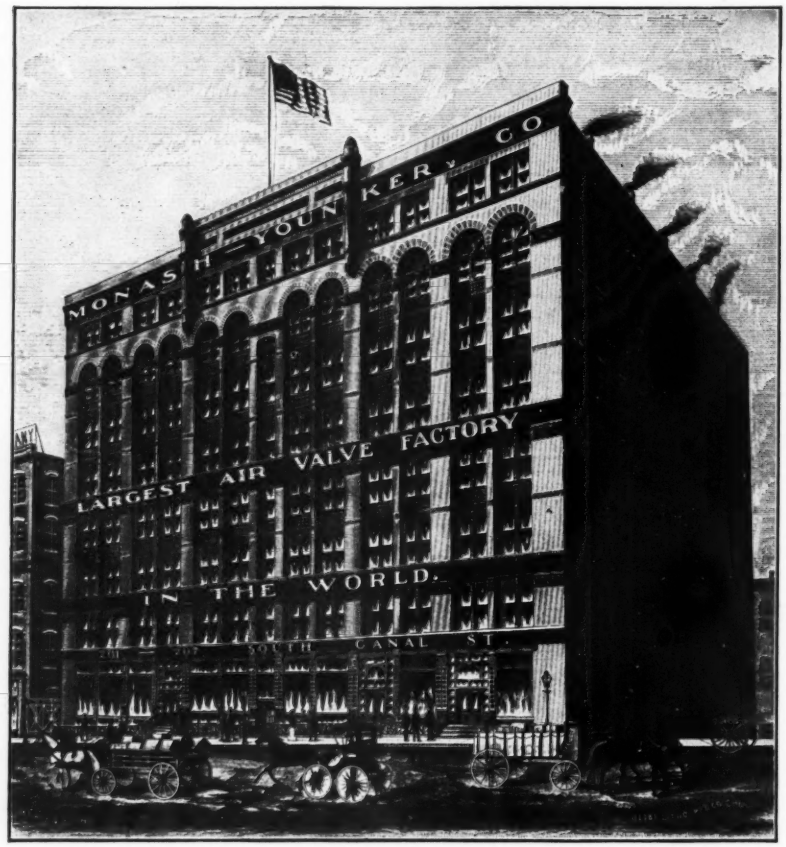
Steam & Water

VERTICAL SECTIONS DIVIDED IN THE MIDDLE
OURS NEVER BREAK. CATALOGUE TELLS WHY

PRIZER-PAINTER STOVE AND HEATER CO.

READING, PA.

NEW YORK	BOSTON	CHICAGO	DETROIT	ST. PAUL
284 Pearl Street	215 Franklin Street	34 N. Canal Street	313 Howard Street	329 Farrington Avenue



We Make 28 DIFFERENT KIND

SEND FOR CIRCULARS AND PRICES

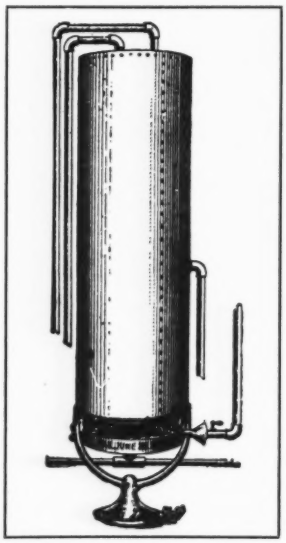
FACTORY AND GENERAL OFFICE

Chicago

43-45 CENTRE STREET

New York

THE A. HELLER HEATER

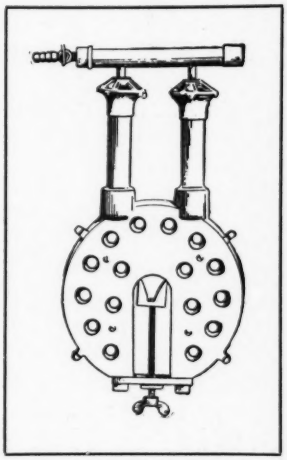


A GAS WATER HEATER

Is just the thing your Customer wants. It's the most Economical and Common Sense Heater ever put on the Market. It will supply the Kitchen and Bathroom with hot water. This heater is attached to the kitchen boiler and takes the place of the kitchen range as far as water heating is concerned, allowing the hot fire in the range to be dispensed with during the summer months. If a gas stove is used when cooking this heater will furnish hot water when wanted.....

PERFECT COMBUSTION NO ODOR
NO DIRT NO SMOKE

Heats in less time, and for less cost than any gas or coal stove in the market.....



SOLD TO THE PLUMBING TRADE ONLY---WRITE FOR CIRCULARS AND PRICES

J. P. B. SADTLER & CO., 813 SOUTH HOWARD STREET, **BALTIMORE, MD.**

WALLACE L. PIERCE, PRESIDENT
GEO. B. LITTLE, VICE-PRESIDENT

OSBORN B. HALL
GEN'L MANAGER MECHANICAL DEPT.

GEO. T. COPPINS, SECRETARY
GEO. H. GRAVES, TREASURER

Walworth Manufacturing Co.

TOOLS AND SUPPLIES

FOR STEAM, WATER AND GAS USERS

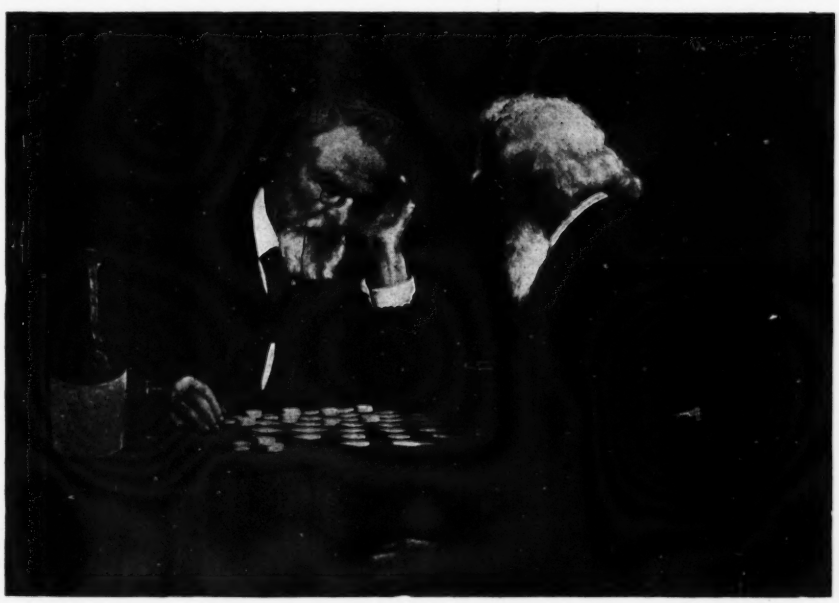
ESTABLISHED
1842

INCORPORATED
1872

128 TO 136 FEDERAL STREET
BOSTON, MASS., U. S. A.

NEW YORK OFFICE, PARK ROW BLDG.
FACTORY, SOUTH BOSTON

THE AMERIGAN PROGESS ENGRAVING GOMPANY



MAKERS
OF
FINE
CATALOGUE
ILLUSTRATIONS

15 to 17 WEST SIXTH STREET, GINGINNATI, OHIO, U. S. A.

GEM Hot Water and Steam BOILERS

EASILY AND QUICKLY SET UP
CAPACITY GUARANTEED

WE ALSO MAKE THE

ABENDROTH VERTICAL SECTIONAL STEAM AND WATER BOILERS

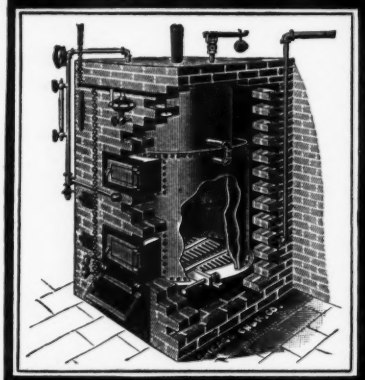
LONG AND FAVORABLY KNOWN TO THE TRADE EVERYWHERE

Write for Illustrated Catalogue

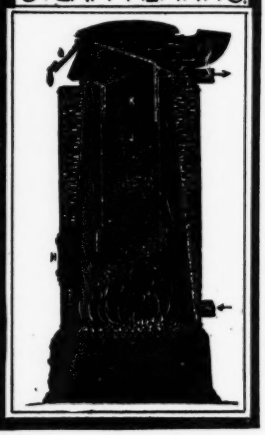
ABENDROTH BROS. 109-111 Beekman St., New York
114 High St., Boston, Mass.
Pt. Chester, W. Chester Co., N.Y.

AGENTS: Crane Co., Philadelphia, Pa. Western Valve Co., Chicago, Ill.

KEWANEE BOILER COMPANY
KEWANEE ILL.



MANUFACTURERS OF
HAXTUN STEEL BOILERS FOR HOT WATER AND STEAM HEATING

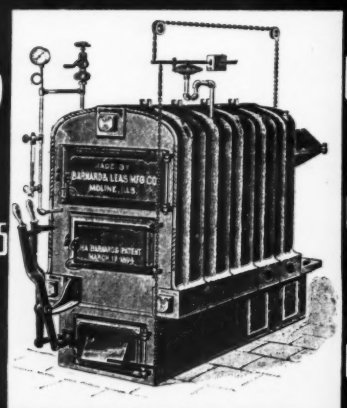


"TABASCO" WATER HEATERS
ALL STEEL SELF FEEDERS

SEND FOR SPECIAL CATALOGUES
169 LAKE ST.
·CHICAGO·

THE BARNARD BOILER FOR STEAM AND HOT WATER HEATING

ADAPTED TO ALL KINDS OF FUEL



IS ECONOMICAL DURABLE AND EFFICIENT

IS SIMPLE AND EASY TO OPERATE

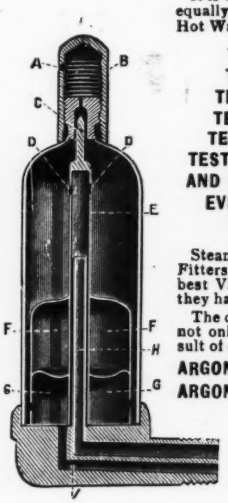
SEND FOR OUR NEW CATALOGUE

BARNARD & LEAS M'F'G CO.,
MOLINE, ILLINOIS.

STANDS ALL TESTS

IN ORDER TO OBTAIN THE BEST RESULTS IN RADIATION IT IS NECESSARY TO USE

The Argon Automatic Air Valve



It is the only one on the market equally efficient on both Steam and Hot Water Radiators.

TESTED FOR AIR
TESTED FOR GAS
TESTED FOR STEAM
TESTED FOR WATER
TESTED FOR SERVICE
TESTED FOR PERFECTION
AND NOT FOUND WANTING
EVERY ORDER BRINGS
ITS DUPLICATE

Steam Heaters, Contractors and Fitters are not acquainted with the best Valve on the market, unless they have tried the ARGON.

The decision of experts, evinced not only in opinion, but as the result of experience, is that the

ARGON VALVES DO THE WORK
ARGON VALVES ARE RELIABLE

Need No Adjustment
Are Guaranteed

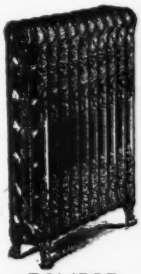
INTERIOR VIEW. EXTERIOR VIEW

WRITE FOR SAMPLE

The Argon Manufacturing Company
DENVER, COLORADO.

BREMEN

Our goods and prices will interest you—permit us to demonstrate this.



ECLIPSE

Holland Radiator Co.

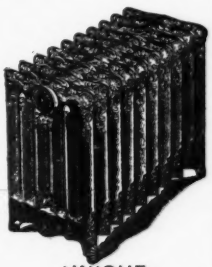
CHICAGO: 38 DEARBORN STREET
DENVER: 1759 STOUT STREET
WORKS: BREMEN, IND.

RELIANCE

Agents:

United States Water and Steam Supply Company, Kansas City

The George Worthington Company, Cleveland

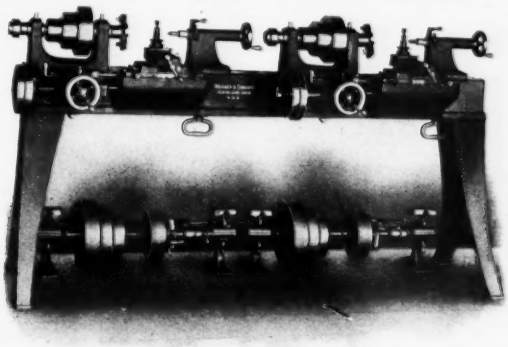


UNIQUE

A COMPLETE LINE OF

Screw Machines and Turret Lathes

BRASS WORKING MACHINERY



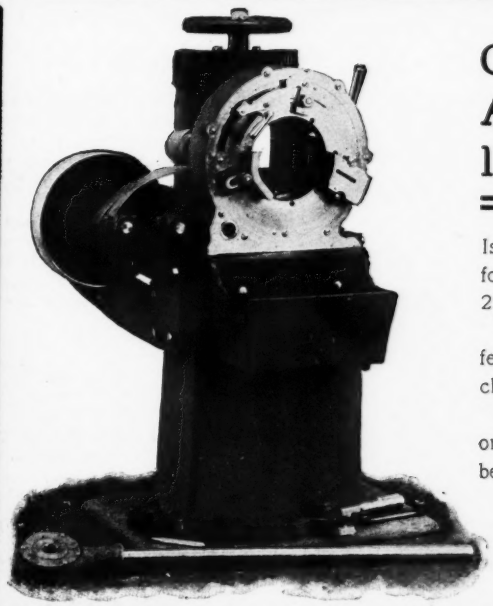
DOUBLE HEAD KEY LATHE
For Turning Keys for Steam, Water and Gas Cocks.

SEND FOR GENERAL CATALOGUE

THE

WARNER & SWASEY CO.

CLEVELAND, OHIO



OUR COMBINATION HAND AND POWER PIPE THREADING AND CUTTING MACHINE

Is the greatest pipe machine you ever saw. It is made in four sizes, to thread and cut off pipe 1 to 4 inches, 1 to 6 inches, 2⅛ to 8 inches, and 4 to 12 inches

The vice is self:centering, actuated by rack and pinion to feed the pipe into the chasers. You furnish the power and the chasers do the rest.

This machine is mounted on a base for use either by hand or power at will. But if yon want to take it out on a job it may be readily removed from its base and used as a portable hand machine.

We want you to know more nbout our line of pipe machines. Catalogue No. 3 tells and its yours for the asking.

THE MERRELL MFG. CO. TOLEDO, O. U.S.A.

This is Not an Acetylene Gas Machine

Ransom Automatic GAS— Machine

Produces by a new process a clean, odorless gas for lighting, heating, cooking, power, etc., at a cost less than any other process.

For Houses, Churches, Halls, Etc., It Has No Equal.

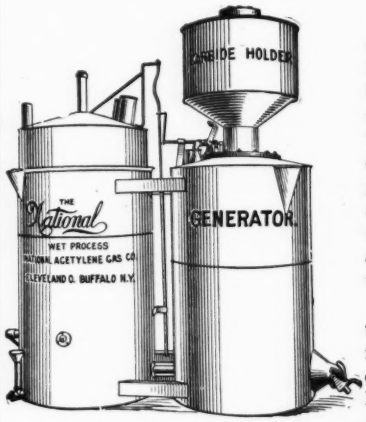
Make your own gas and save 50 per cent of what it costs you now.

The cheapest and best artificial light in the world is produced by the Ransom Gas Machine. Absolutely safe, being approved by Board of Underwriters. A 60 candle power light will not cost to exceed one-quarter of a cent per hour. Fifty cents per week will furnish sufficient gas to do your cooking. The Ransom has no equal. Agents wanted.

Ransom Gas Machine Co.

374 E. Water Street MILWAUKEE, WIS.

The New National



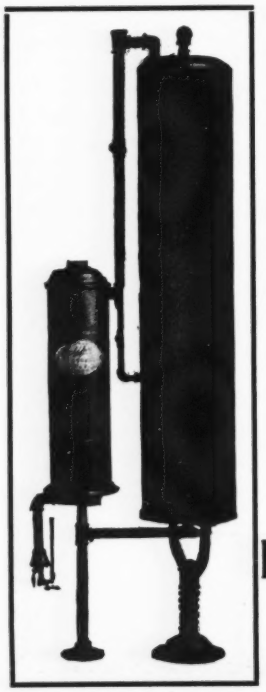
The only machine on the market which can be loaded with enough carbide to run 30 days or more without recharging. The only machine which does not produce after-generation when lights are turned off. The only machine which does not allow the gas to escape while recharging.

The carbide is fed into the water in a granulated form, thereby insuring cool, pure gas at all times. By our process of purification we are enabled to use Acetylene gas for cooking and running gas engines. The new National is fully approved by all the Boards of Fire Underwriters throughout the United States. **Local and General Agents Wanted**

Boston National Acetylene Gas Co.

17 State Street, Boston, Mass.

ECLIPSE ROUND WATER HEATERS



We think:
Round Water Heaters are the best form. Take room which is useless for other purposes.
Our Round Heaters better than those copied after ours, but not possessing our advantages.

Why low prices?
Built special machinery; must have volume to keep going; their sale stimulates gas range business.

Merits:
Our Heater, under severest tests, has from 35 to 50 per cent greater efficiency than others.

New Catalogue, just ready; mailed on request, mentioning Domestic Engineering

Eclipse Gas Stove Company

ROCKFORD, - ILLINOIS

COLT TRADE MARK.

CARBIDE FEED ACETYLENE GAS GENERATORS

Indorsed by the United States Government. The Department of Agriculture of the State of Pennsylvania says: "Safer than the usual employment of petroleum."
Entirely new principles involved. Made of the best materials, by the most expert mechanics. Guaranteed by the largest and most experienced concern in the business.

The COLT TRADE MARK Generators, are lower in price, more economical, and more easily installed and operated than any other make, and occupy one-quarter of the space.
No waste of gas; no heating. This is not true of other makes.

J. B. COLT CO.

21 BARCLAY ST,
NEW YORK, N. Y.
421 Chestnut Street, Philadelphia, Pa.
146 Franklin St., Boston, Mass. 189 La Salle St., Chicago, Ill.

Our New Heater

The Acme No. 15

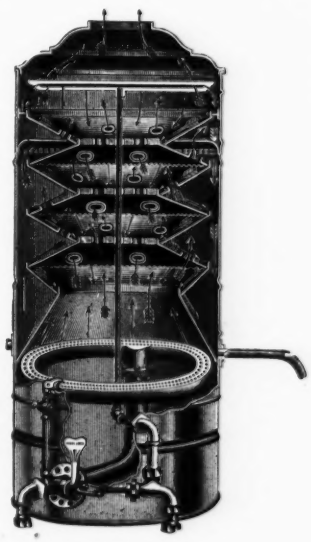
Will please your trade. It heats more water with a smaller Gas Consumption than any other Heater on the market.

It is 28 inches high and 12 inches in diameter

List price, nickel plated,

$20

IT HAS A LARGER HEATING SURFACE CONSIDERING ITS SIZE, THAN ANY OTHER HEATER ON THE MARKET.



There are other new features that will interest you. For information about them and discounts, address

THE MAKERS OF THE

Douglas, Acme and Flush Heaters

The Instantaneous Water Heating Co.

OHIO AND ORLEANS STREETS

CHICAGO

THE EAGLE

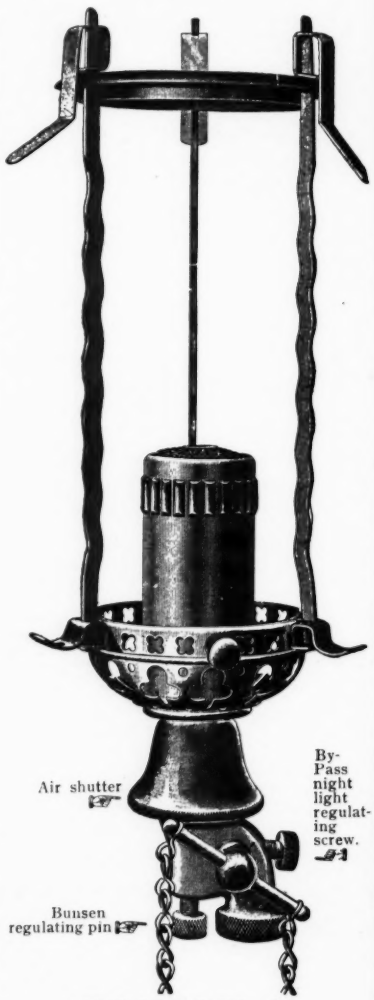
THE EAGLE NO. 3.

INSTANTANEOUS WATER HEATERS INCANDESCENT GAS BURNERS

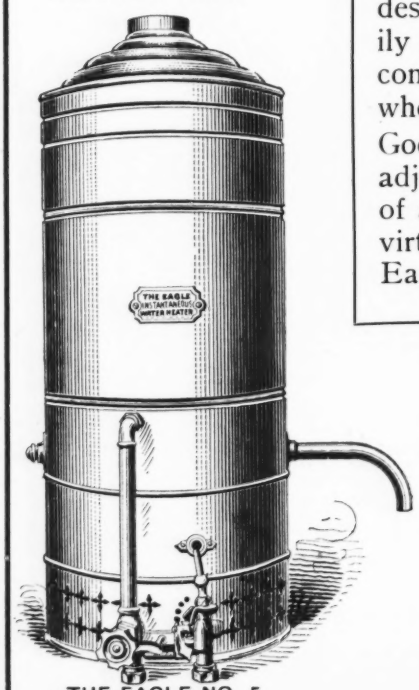
Will prove themselves the favorites for 1901.

The Interlocking Valves with Safety Pilot Light, as fitted to all Eagle Heaters, insures safety in using. The only make Heater in the world wherein all parts are interchangeable.

A By-pass Burner for Incandescent Gas Lighting that readily adapts itself to the varying conditions. It is the kind that where one is tried others follow. Good light, non-clogging, easily adjusted, and the new feature of a night light, these are the virtues that are winging the Eagle to the top.



THE EAGLE NO. 47.

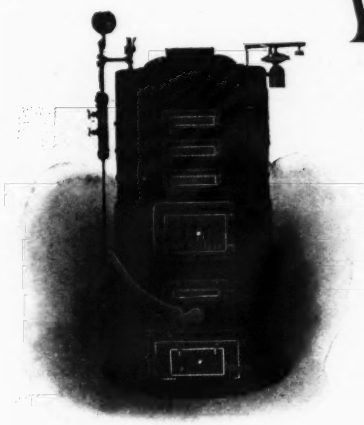


THE EAGLE NO. 5.

MANUFACTURED BY

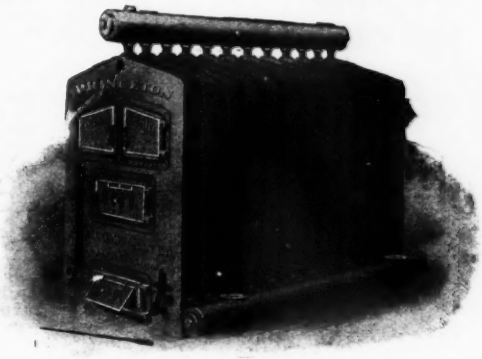
The S. Bernstein Co.

82-86 WEST BROADWAY, NEW YORK



Did It Ever Occur to You?

That a bank account was concealed in the ashpit of your heating apparatus?
A big lump of coal or a small one, which?
Economy of fuel consumption is our strong point.



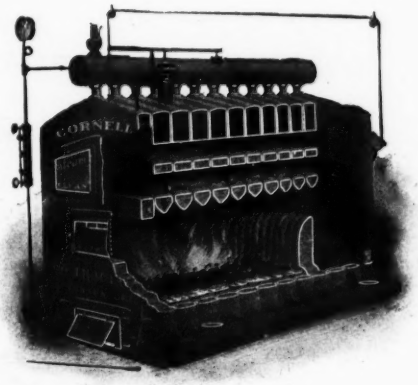
That Tells the Whole Story

For Hot Water

Princeton
Humber
Amherst
Yale
Sandow

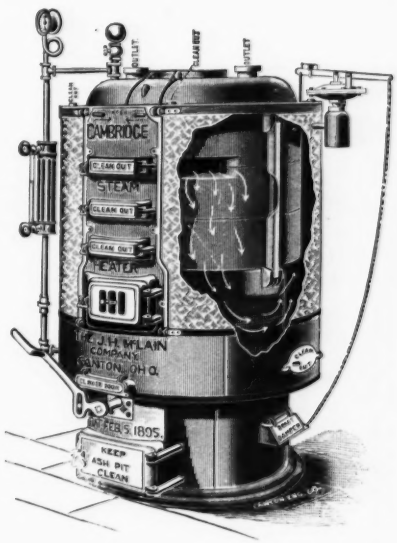
For Steam

Cornell
Oxford
Cambridge



POSITIVE AND RAPID CIRCULATION AND BUILT ON MERIT.

Catalogue "B" for the asking..



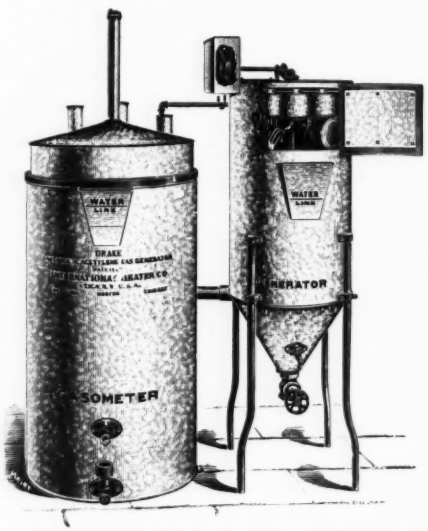
The J. H. McLain Company

WORKS AND MAIN OFFICE
CANTON, OHIO
BRANCHES
NEW YORK PHILADELPHIA CHICAGO

The DRAKE Automatic Acetylene Gas Generator

APPROVED BY NATIONAL BOARD OF FIRE UNDERWRITERS

THE MOST PERFECT ACETYLENE GENERATOR EVER PLACED ON THE MARKET.



AUTOMATIC
SIMPLE
SAFE
DURABLE
ECONOMICAL

The Drake Generator is not an experiment nor does it belong to the "tin can" class of generators of which there are so many on the market. It is made on the only principle sanctioned by Acetylene Authorities and is made to last. The gas is generated under water and after passing through a second body of water and our special purifier is delivered to the burner in the highest state of purity: this means economy. If interested send for Catalogue "H" and price list.

International Heater Company

Largest Makers of Heaters and Lighting Apparatus in the World

Utica, N. Y.

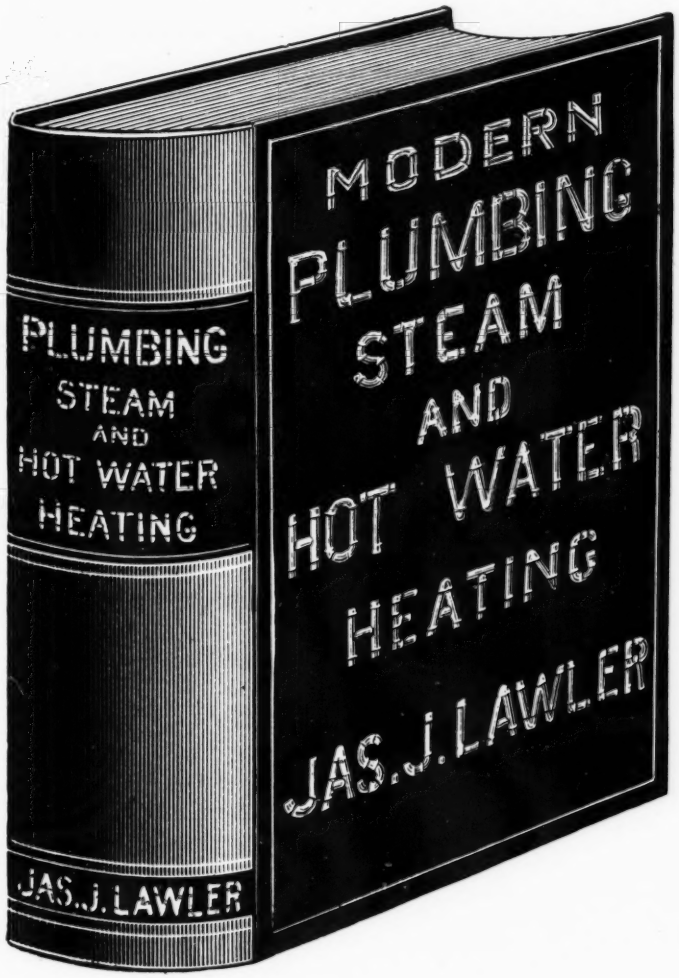
NEW YORK
237 Water St.

BOSTON
47 Union Street

CHICAGO
48 Dearborn St.

PARIS GOLD MEDAL 1900

LATEST AND BEST



In Plumbing

It explains soil and waste pipe ventilation, back venting, the house trap, the fresh air inlet and their advantages. Siphonage of traps, the cause and how to remedy the same. How to test soil and waste pipes. Probable questions of plumbing examining boards, and answers to same. Hydraulics of plumbing, with original illustrations. Practical drawings and all important features in the construction of modern plumbing work.

In Heating

It tells how to correctly figure on any size or shape of building with steam or hot water. How to find the heating capacity of any shape or make of boiler for steam or hot water heating. The most practical timesaving tables ever compiled and published. A new table of how to quickly find the correct measurement of 45° angles, a most useful thing in steam and hot water construction. This has never before appeared in print.

More practical illustrations than ever published in any one volume, which shows the various systems of construction, in the heating and ventilating of buildings by the steam or hot water systems.

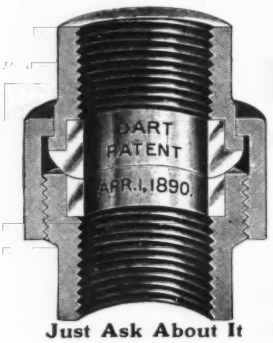
Over three hundred diagrams and illustrations, showing the various systems of construction in the heating and ventilating by steam or hot water systems. Six folding inserts showing waste pipe system of plumbing, one pipe system of both steam and hot water heating, overhead system, fan system of heating and ventilation, and steam and hot water circuits. 400 pages, large octavo size, 10x7½ inches. Bound in extra cloth.

Price, $5.00

DOMESTIC ENGINEERING, 58-64 N. Jefferson Street, CHICAGO

A Union forever

Is the



Dart Union

Best in the World

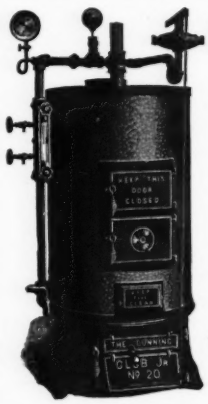
Bronze Ball Seats
Ground Joint
Mal. Iron Ends and Nut

Manufactured by

E. M. DART MFG. CO.

Providence, Rhode Island

Just Ask About It



DUNNING BOILERS

THE OLD RELIABLE

A NEW TYPE FOR SMALL HOUSES.

THE CLUB JUNIOR

	STEAM	HOT WATER
No. 15	175 ft.	275 ft.
No. 20	200 ft.	325 ft.
No. 30	250 ft.	425 ft.
No. 40	300 ft.	525 ft.

Write for new Catalog

New York Central Iron Works Co.

GENEVA, N. Y., U.S.A.

N.S. Bouton Pres. E.H. Sedgwick Treas.,& Gen'l Mgr.

WILKS

HOT WATER HEATERS
AND STEAM GENERATORS

Best in Use ::::: All Steel ::::: No Coils "Flues"
No Cast Iron Sections :::::: Send for Catalogue

S. WILKS MFG. CO.

63 SOUTH CLINTON STREET, CHICAGO, ILL.

NEW YORK OFFICE,
JUDSON A. GOODRICH CO., 105 BEEKMAN ST.

KENNEDY GLOBE VALVE

WITH RENEWABLE DISCS

Never leak :: Always reliable

Are extra heavy, made of best steam metal. Unusually large opening for passage of steam or fluid.

PERFECTLY TIGHT UNDER ALL PRESSURES OF STEAM, OIL OR GAS

Send for descriptive catalogue

The Kennedy Valve Mnfg. Co.

66 BEEKMAN STREET

Works: Coxsackie, N.Y. NEW YORK

...USE...

K. & M. Valves

HIGH-GRADE WORKMANSHIP
PACKED STEMS
GENUINE STEAM METAL
THOROUGHLY TESTED

Sold from Standard Lists.

KINSEY & MAHLER CO., - PEORIA, ILL.

Our Specialty

Is a staple line of brass cocks and valves for gas, steam and water. We aim to make these goods so that they will please the user. We sell them so that the jobber can make some money on the deal. We make a style of high grade right and left stop and waste cock with detachable handle that is a winner.

Powhatan Brass & Iron Works

CHARLESTON, W. VA.

REMOVAL NOTICE!

New Britain, Conn., April 15, 1901.

The Beaton & Bradley Co., (formerly of Southington, Conn.) manufacturers of A. J. Beaton's Floor and Ceiling Plates, Pipe Hangers, Floor Sleeves, etc.

HAVE REMOVED THEIR BUSINESS TO NEW BRITAIN, CONN.

With improved and increased facilities the company will continue to blaze the way, and challenge a comparison of their goods with those of any other make.

We take this opportunity of expressing our thanks to our patrons for their past favors, and we invite all users of our goods to give them a trial.

The Beaton & Bradley Company

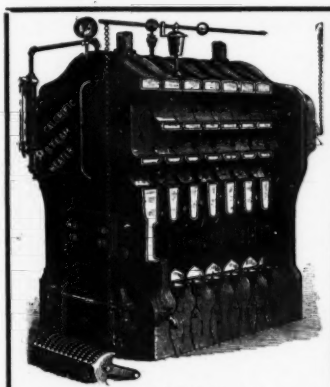
NEW BRITAIN. CONN.

Coming Heat of Twentieth Century

The Jas. A. Trane System of Vacuum Heating has all the advantages of Hot Water Heating with none of its objectionable features.
Will heat a building with from 25 to 50 per cent less fuel than a Hot Water System.
Is absolutely noiseless in operation.
In case of breakage not one drop of water will escape from the system.
Such a thing as an explosion is an utter impossibility.

The Jas. A. Trane Vacuum System of Heating.

201-203 South Fifth Street, La Crosse, Wis.



The Calorific Sectional

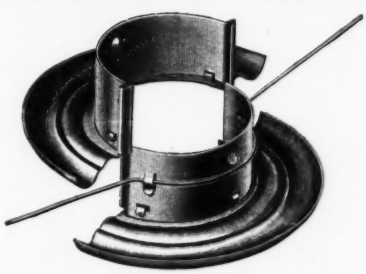
Always Good and Cheaper than others...

Also make Calorific Gem and Calorific Junior.....

Agents treated fairly and wanted..... .....

Calorific Heater Co.
Easton, Pa.

THE H. B. PERFECTION
CEILING PLATE



The only split plate that always stays in position; not affected by expansion of steam pipes; handsome and strongly made.

Will you ask for prices?

HOUGHTON & BUXTON CO., Worcester, Mass.

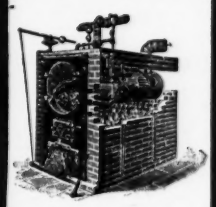
Boilers 30 years old and good yet.

Garth & Co., Montreal, have made water tube heaters for 30 years and claim to have 30 year old boilers still in use and good. We have nine year old heaters still in use and good. Cast iron boiler makers cannot tell you such a story truthfully.

"PHELPS IDEAL"

is a safety Water Tube Heater for Hot Water or Steam. Much used in the west; worthy of use anywhere. **Good Agents Wanted.** Literature free on application.

IDEAL HEATING COMPANY
OSKALOOSA, IOWA



VANCE

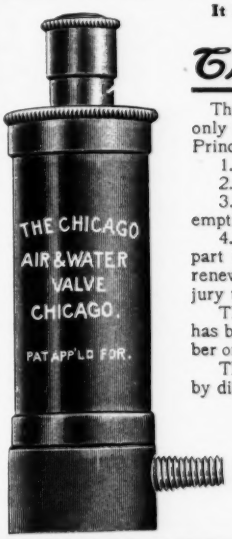
FOR

Steam and Hot Water Heating

FOR SOFT OR HARD COAL

Durable and Economical. We claim to save 33 per cent in fuel, as compared with other boilers.

Vance Boiler Works, Geneva, N. Y.



It is not only the name but the valve!

The "CHICAGO"

This Steam Radiator Air and Water Valve is the only valve that has the four correct Mechanical Principles of Perfection.

1. It will free radiators and coils from all air.
2. It absolutely prevents all water leakages.
3. The air chamber and separate partition empties valve from water and it will not water-log.
4. Durability of valve is assured, as expansion part is protected from injury and can be readily renewed at slight cost, while with other valves injury to expansion part destroys valve.

This valve is entirely automatic in action and has been severly tested, having been in use a number of years and giving perfect satisfaction.

The several features of this valve are protected by distinct patents. Other patents pending.

None Genuine Unless the Name "CHICAGO" is Stamped thereon.

Chicago Air & Water Valve Co.
31-33 South Canal Street
Chicago, Ill.

Bundy Daisy Tank Heater.

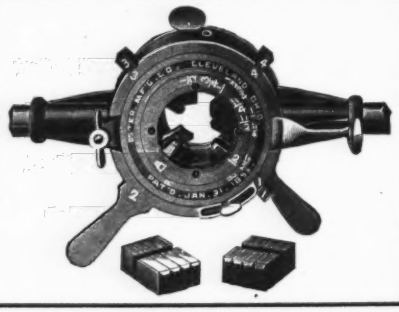
HOW'S THIS FOR A LETTER

"I have put in apartments, Nos 414, 416 and 418 West 38th St., New York, three of your Bundy Daisy Tank Heaters No. 1417. One half each heater is heating a tank 30x72 inches supplying 12 families with hot water; the other is heating a tank 30x60 inches supplying 8 families. One half of heater and one tank is supplied from the street and the other half and other tank is subplied from roof tank. They are giving entire satisfaction.

J. J. Holloran.

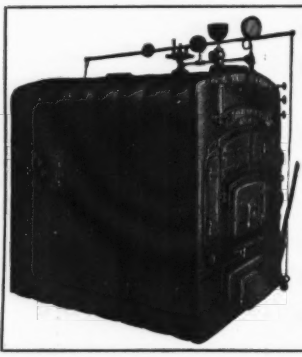
Each half of the Bundy Tank Heater may be connected separately, in fact one may be used for heating a tank and the other for heating radiators.

A. A. GRIFFING IRON CO.
66-68 Centre Street, New York
Boston Philadelphia Jersey City
Send for catalogue DB and bottom prices.



Steel pipe is easily and accurately threaded with our modern tools

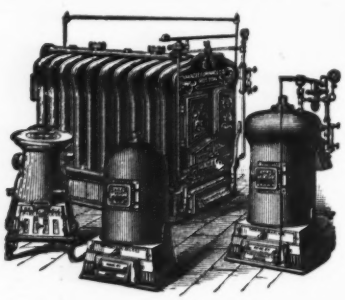
The Oster Mfg. Co.
8 East Prospect Street, Cleveland, Ohio



HAVE YOU SEEN
The Furman
New Model Boiler
For Steam or Hot Water (Interchangeable)

Sectional—Self Contained—Surface Burning—19 sizes—Capacities 350 to 4000 sq. ft.—Any size can readily be enlarged—Let us send you Free our new Catalogue and Fitter's Hand Book of valuable information for Practical Fitters. Write for them to-day.

The Herendeen Mfg. Co. Dept. D.
Geneva, New York
Branches: New York, Boston, Bloomington, Ill.
Philadelphia Office, Builders' Exchange



MAGEE STEAM AND HOT WATER HEATERS

GOLD MEDAL HIGHEST AWARD
PARIS EXPOSITION

THE MOST COMPLETE LINE UNDER ONE NAME MADE IN THE UNITED STATES

OUR CAPACITIES RANGE IN
Square feet of Water Radiation 100 to 6,000
Square feet of Steam Radiation 200 to 3,600

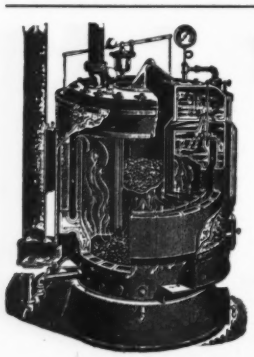
Send for catalogue Correspondence solicited

MAGEE FURNACE CO., BOSTON, MASS.

DIXON'S GRAPHITE COMPOUND

Is infinitely better than red or white lead for making steam, gas or water pipe joints. Joints will be tighter, and can be broken months or years after without damage to pipes or tools. IT WILL PAY EVERY PIPEFITTER TO SEND FOR SAMPLE AND CIRCULAR.

JOSEPH DIXON CRUCIBLE CO., JERSEY CITY, N. J.

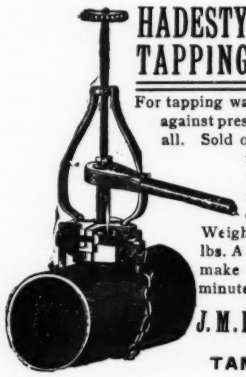


YOU KNOW

How coal is wasted up a flue. We guarantee the "ROBERTS" to be the most economical and easily managed boiler on the market. Will not such a boiler get you further orders?

Philadelphia Office:
Builders' Exchange,
18 South 7th Street

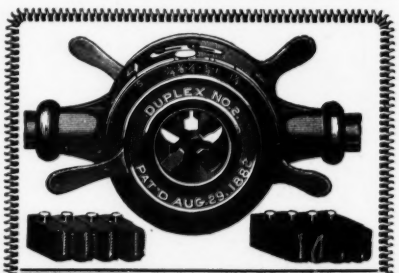
Roberts Machine Company
Collegeville, Pa.



HADESTY IMPROVED TAPPING MACHINE

For tapping water and gas mains against pressure. It leads them all. Sold on approval. Taps mains from 3 to 30 inches. No saddles required for different sized mains. Weight, complete, only 18 lbs. A boy 12 years old can make a connection in 15 minutes. Get prices from

J. M. HADESTY & SON
TAMAQUA, PA.



HART'S

DUPLEX ADJUSTABLE STOCKS and DIES should be in the hands of every PLUMBER AND PIPE FITTER. DO YOU OWN ONE? Let us mail you list and quote prices : : : : :

THE HART MFG. CO.
No. 19 Wood Street Cleveland, Ohio

WORDS OF WISDOM

"Do not advertise and stop,
But advertise and stay,
For those who read your ad last week,
Will look for it to-day."

The Climax Ratchet Stock

is an indispensable tool for conveniently threading iron pipe in ditches, under floors, in corners, overhead, etc. With this tool threads can be cut without removing whole lengths of pipe. This tool is provided with a strong vise which securely grips the pipe, and by means of the leading thread the die is forced on pipe and the thread is cut. It is made of malleable iron and steel, and, while light in weight, making it convenient to carry, is very strong and rigid. The advantages of this tool make it absolutely indispensable to Plumbers, Steam and Gas Pipe Fitters, Gas and Water Companies, Machinists, etc. It takes standard size dies, which are extra if furnished.

No. 1 threads ¼ to 1 inch pipe, takes die 2 and 2½ inches square.....$10.00
No. 2 threads 1 to 2 inch pipe, takes die 2½, 3 and 4 inches square $17.00

For sale by leading jobbers.

MANUFACTURED SOLELY BY
C. M. KEMP MFG. CO.
BALTIMORE.

BROOMELL'S VAPOR SYSTEM or STEAM HEATING.

Adapted to buildings of any kind or size. Has all advantages of hot water heating without any objectionable features. Absolutely noiseless. No pressure. No air valves. No pumps or machinery. Superior to any other system of heating and costs less. Installed by all steamfitters. : : : : : : SEND FOR CATALOGUE.

VAPOR STEAM HEATING CO., YORK, Pa.

Will it Save?

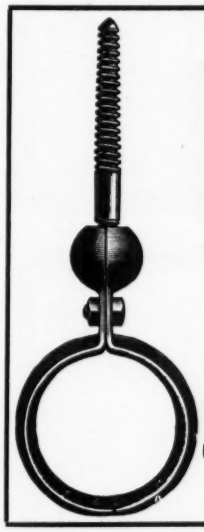
QUERY:—Will it really save enough in fuel, and boiler wear-and-tear, to earn a handsome annual dividend on the cost of its installation? The "it" here alludes to

The Webster Feed Water Heater and Purifier.

ANSWER:—It most certainly will do precisely that, and its adoption by those who "look things up" before buying is the result of its own powers to prove this claim. Shall we tell you all about it in a small Booklet?

Warren Webster & Co.
CAMDEN, N. J.

NEW YORK, 322 BROADWAY.
PHILADA., 1105 STEPHEN GIRARD BLDG.
CHICAGO, 1509 MONADNOCK BLDG.
BOSTON, 729 TREMONT BLDG.



Hanna Ball Joint Pipe Hanger

Simplest...Strongest

Made of Malleable Iron. All ways the best. Carried in stock and for sale by all :::::: Supply Houses

The Penn Engineering Company
312 Cherry St., Philadelphia, Pa.

TANKS

With CYPRESS at our very door and our improved machinery and increased facilities we can supply any size tank or vat at a most reasonable price

AT SHORT NOTICE

Correspondence Solicited.

G. M. DAVIS & SON
COR. LEMON AND 8TH STS., PALATKA, FLA.

Don't be a Hidebound Hawkins

There is some where in the United States (we don't like to say just where) a manufacturer of brass articles who was investigating our **Forming Lathes**; we looked over his work and told him the number of pieces per day our lathe would make, and then he wouldn't buy a lathe because he said **HE COULDN'T SELL MORE THAN HALF AS MANY GOODS AS THE LATHE WOULD MAKE.** We have nicknamed this man "Hidebound Hawkins." ::: ::: ::: ::: :::

The Meriden Machine Tool Company
106 Britannia Street, Meriden, Conn., U. S. A.

JARECKI MANUFACTURING CO., = Erie, Penn.

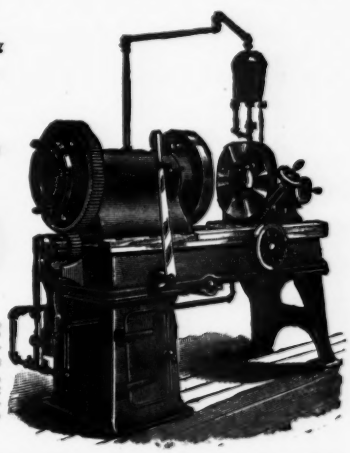
Erie Pipe Hangers

Erie Malleable Unions Copper P 'ck'g
Always ready for instant use.

Malleable and Gray Iron Pipe Fittings

Drainage Fittings

Pipe Threading and Cutting Tools Write for catalogues showing the most complete line of ⅛-inch to 16 inches for Hand, Belt, Engine, and with Electric Motor Attachment. We can furnish Bolt-Threading Attachments for these machines.



BARNES 3-Wheel Pipe Cutters

Made in 8 sizes, cutting pipe from ⅛ to 12 in. diam.

The "Genuine" bear this registered trade mark.

Manufactured by **Barnes Tool Co.** NEW HAVEN, CONN.

WE OFFER YOU:—

Enameled Flat and Roll Rim Kitchen Sinks.
Enameled Corner and Flat Back Lavatories.
Lavatory Traps, Brackets and Supply Pipes.
Bath Supplies, Solder, Nipples and a large variety of Plumbing Brass Goods.

GET OUR PRICES BEFORE PLACING YOUR ORDER.

THE HUMPHRYES MFG. CO.
MANSFIELD, OHIO
New York Office: 81-83 Fulton Street.

A Paul System Heating Plant

Costs less to operate than any other type of heating plant. No disagreeable odors from air valves. Every square inch of heating surface rendered effective. Steam held in radiator until condensed. Water returned to boiler at high temperatures.

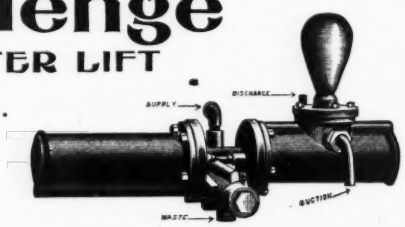
The Paul System can be introduced upon any type of existing plant or installed in connection with any new plant. You make money, and your client saves money by introducing the **Paul System.**

PAUL SYSTEM COMPANY

Boston: 38 Pearl St. New York: Park Row Bldg.
Chicago: 1212 Fisher Bldg. St. Louis: 1311 Chemical Bldg.

The Challenge
AUTOMATIC WATER LIFT

FOR TANK OR DIRECT PRESSURE.



Balanced valve. Always works.
Cannot stick. Fully guaranteed.
M hydrants, plumbers' brass work.
Write for prices and catalogue.

The O. P. Benjamin Manufacturing Co.
LA FAYETTE, IND.

People who read this edition of DOMESTIC ENGINEERING buy one hundred per cent of all heating and plumbing supplies sold in the United States.

The heating trade can please their customers and make money handling the

Æolipyle

WHEN PROPERLY APPLIED TO A SMOKE PIPE

Saves
TIME
LABOR
AND
COAL

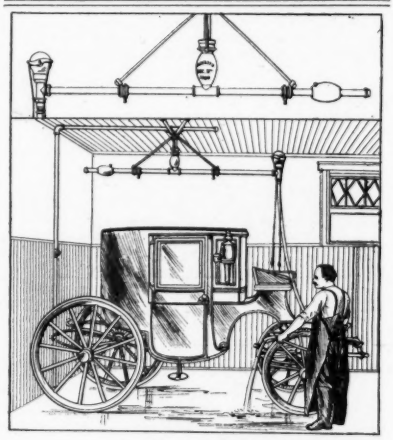
Besides Making Additional Heat

SEND FOR CIRCULAR AND TRADE DISCOUNTS

ÆOLIPYLE COMPANY

117 Beekman Street NEW YORK

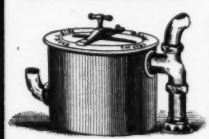
Swinging Hose Bracket



for Buggy Washing, Boiler Blowing, by water or steam, conveying liquids to different receptacles; useful in stables, factories, foundries, round houses, breweries, pickle factories, etc. A clever plumber will find hundreds of places for it. Agents wanted—Territory free.

L. T. Foreman & G. E. Beck
440 North 24th Street SOUTH OMAHA, NEB.

EXCELSIOR
GREASE TRAP



Well and favorably known; two sizes for hotels and restaurants and residences. Get list price and trade discounts.

SPROUL & McGURRIN
GRAND RAPIDS, MICH.

DESPER'S Specialties

Bracket Rings
for Range Boilers, Leave clear floor.

Elevator Water Register
Tells Water used on hydraulic elevators.

Soil Pipe Testing Valve
Cleverest of all.

Fresh Air Inlet Guard
Cannot be stopped up.

Balsago Soil Pipe Cement
Saves many broken Hubs.

Send for Specialty Circulars

H. A. DESPER
Worcester, Mass.

Sent on receipt of $3.00.

American Plumbing Practice.

FROM THE ENGINEERING RECORD
(Prior to 1887 The Sanitary Engineer).

This includes elaborately illustrated descriptions of the Plumbing in notable Residences, Hotels, Hospitals, Office Buildings, Amusement Halls, Public Buildings, Theatres, Swimming and Rain Baths, besides a great variety of questions and answers on heating of Swimming Baths, Hot-Water Supply, Circulation from Kitchen Boilers and House-Drainage Problems.

Cloth, 8 x 11 ins 536 Illustrations.

Send for Table of Contents.

DOMESTIC ENGINEERING, CHICAGO

Some Reasons for Sending Us Your Orders

1. We value them.
2. We give them careful attention.
3. We make prompt shipments.
4. We give good value for the money, (some say the best).
5. We cheerfully correct errors (some concerns never (?) make any.)

Next month we give you additional reasons.

We handle everything in Plumbing, Gas, Steam and Water Supplies.

Sanitary Specialty Manufacturing Co.

55-57 N. CLINTON ST., 24-30 MILWAUKEE AVE., CHICAGO.

Put it down in Black and White the

MONON ROUTE

IS THE DIRECT LINE BETWEEN

CHICAGO, INDIANAPOLIS, CINCINNATI AND LOUISVILLE

CITY OFFICE 232 CLARK ST., CHICAGO.

The Lamp of Steady Habits

The lamp that doesn't flare up or smoke, or cause you to use bad language; the lamp that looks good when you get it and stays good; the lamp that you never willingly part with, once you have it; that's

The New Rochester.

Other lamps may be offered you as "just as good" —they may be, in some respects, but for all around goodness, there's only one. To make sure the lamp offered you is genuine, look for the name on it; every **New Rochester** lamp has it.

We make oil stoves too, just as good as the lamps; in fact, anything in oil or gas fixtures.

THE ROCHESTER LAMP CO.,

38 Park Place and 33 Barclay St., New York.

Sisson Insertable Joint

Indispensable to Plumbers

A friend in need is a friend indeed.

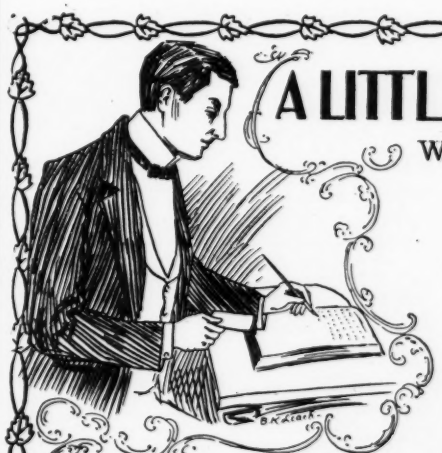
THE S. I. J.
FOR SOIL PIPE
Sizes 2 to 6 inches. Light and Heavy.
Makes a neat job and saves your patience.
ASK YOUR JOBBERS FOR IT

This does the trick.

MANUFACTURED BY

R. ESTABROOK'S SONS

SOUTH BOSTON, MASS.



A LITTLE FIGURING

WILL PROVE

THE USEFULNESS OF OUR ESTIMATE BOOK

COMPLETE LABOR-SAVING.

A sure means for estimating correctly and avoiding loss.

The Contract and Estimate Record Book

.....FOR PLUMBERS

Office Editions: 100 Complete Estimates, $1.50
250 Complete Estimates, $2.50.

Pocket Edition: 50 Complete Estimates, 50 Cents.

The Victor Instantaneous Water Heater

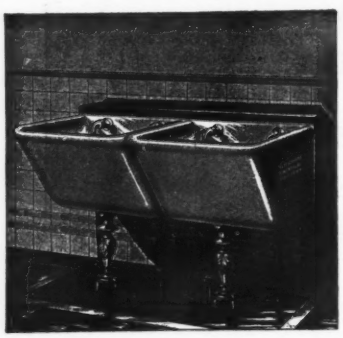
is the cheapest, the most efficient and the neatest water heater made. It occupies but little space and is always ready, furnishing hot water in a few seconds, day or night.

The Victor received the highest award at the Omaha Exposition in 1898.
Write for descriptive circular, prices, discounts, etc.

W. J. ADAM....JOLIET, ILL.

Domestic Engineering

The Leading Journal of its Class



Good Goods Only at Factory Prices.....

Good buyers want to know what that means. They may learn by asking for a catalogue of our imperishable Sanitary Laundry Trays and Sinks.

Chas. Graham Chemical Pottery Works

986-1018 Metropolitan Avenue,
Brooklyn, New York.

DON'T BLAME THE PAPER

"I know the readers are there and that they have money to spend. When I fail to get results I know there is something wrong at my end of the line." :: :: :: :: :: :: :: ::

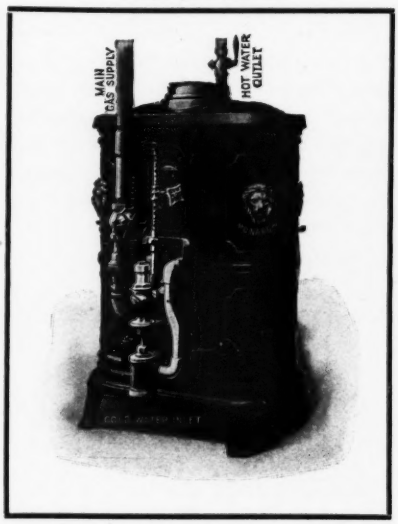
Cheer up, Jack! Don't be a Lobster!

The Seiben Floor Drains

are the best that ever. They save digging a deep ditch. Calking of joints. Extra fittings. Hours time and grief. No stoppage of sewers. No evaporated trap seal. No back water and need no vent pipe. They are made with or without back water valve. Ask your jobber or write for our new catalogue.

THE SIEBEN MFG. & SUPPLY CO.
1120 Holmes Street
KANSAS CITY, MO.=====U. S. A.

"MONARCH" LEADS



The "MONARCH" Automatic Instantaneous Water Heater, is the first and the best; in fact 'tis the "survival of the fittest".
Send for Catalog fully illustrated and you will be convinced.

MONARCH WATER HEATER CO.,
306 Wood St. Pittsburg
Robert B. Caverly, 504-506 Tenth St., Washington, D. C.

THEORY AND PRACTICE OF

LEAD BURNING

By the Autogenous Process
OR HOW TO SOLDER WITHOUT SOLDER

With full instructions to the amateur in the details of the machine and the management of the gases, with valuable suggestions and directions for practice

BY AN EXPERT

Every Plumber Should Have This Book

PRICE, BY MAIL, $1.00

Domestic Engineering, Chicago

The GENESEE No. 10

Frost Proof Automatic Water Closet

For outside locations where other closets will freeze. Perfectly frost proof in zero weather. Tank and pipes always empty except when closet is in actual use. Cannot be used without discharging itself; no water left above frost line.

Ask for catalogue of other goods.

Genesee Automatic Closet Co.
ROCHESTER, N. Y.

DOMESTIC ENGINEERING

Has a field of its own
THAT IS WHY

Advertisers get results

THE CELEBRATED

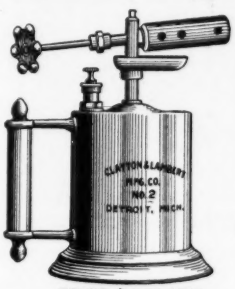
BOSS WASHER

TAKE NOTICE
No Boss Washers are Genuine that do not have the inventor's name
"ANDREW BELL"
on Label of box.

Samples sent by Mail

MADE ONLY BY
ANDREW BELL
375 MARKET ST., NEWARK, N. J.

The All Right Torch



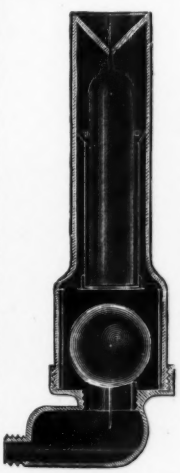
is fitted with our best round burner, and with brass **air pump**, making it **The Best Round Burner Torch** on the market. Sold by jobbers everywhere or we will ship by paid express upon receipt of $3.25. Catalog free. It's worth dollars to you.

Clayton & Lambert Mfg. Company
Detroit, Mich.

PRICE $2.50 NET.

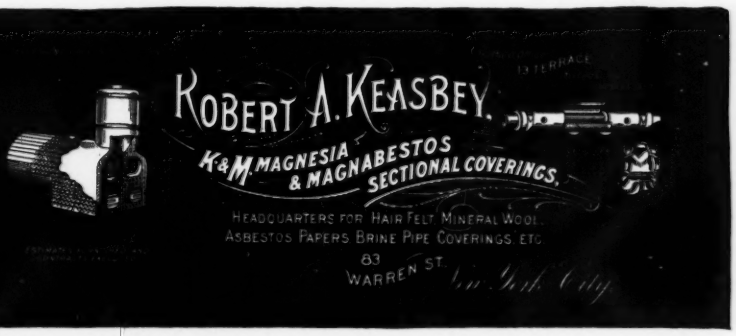
MORGAN'S

TWENTIETH CENTURY AIR AND VACUUM VALVE



Is a positive seal against the return of air to the radiator through itself, and enchances the value of a low pressure steam heating plant fuly 50 per cent, while it materially reduces the coal bill.

MORGAN & COMPANY
40 DEARBORN STREET
CHICAGO, ILLINOIS

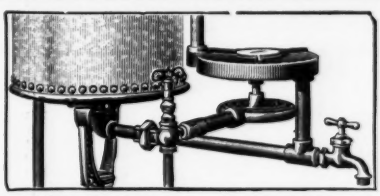

ROBERT A. KEASBEY.
K&M MAGNESIA & MAGNABESTOS SECTIONAL COVERINGS.
HEADQUARTERS FOR HAIR FELT, MINERAL WOOL, ASBESTOS PAPERS, BRINE PIPE COVERINGS, ETC.
83 WARREN ST. New York City

SMOOTH-ON TRADE MARK **COMPOUND IRON CEMENT No. 4**

will repair leaky boilers, piping, etc., it will withstand fire, water, steam and oil, it expands and contracts the same as iron. Write for catalogues and prices.

SMOOTH-ON MFG. CO., 547-549 COMMUNIPAW AVE. JERSEY CITY, N. J.
VREELAND TOMPKINS, Chemist and Manager.

NAUGATUCK SEAMLESS
GUARANTEED FOR ONE YEAR
FOR RECEIVERS STEAM TRAPS REGULATORS ETC.
TESTED TO 300 LBS.
COPPER BALL FLOATS
NAUGATUCK MFG. CO. NAUGATUCK, CONN.



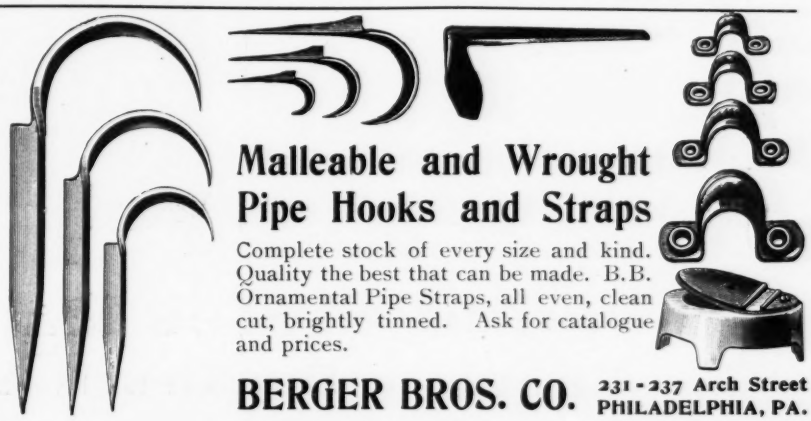
HOLLANDS WATER HEATER

Connection on bottom of Heater and top of Burner for Nipple any length desired.

Saves the hot water boiler and heats the water quickly. Can also be used as a One Burner Hot Plate. Any small burner can be used, but the above Burner gives the best results, and least cost.

The cheapest and most economical Heater on the market for either Natural or Manufactured Gas.

HOLLANDS MANUFACTURING CO., ERIE, PA.



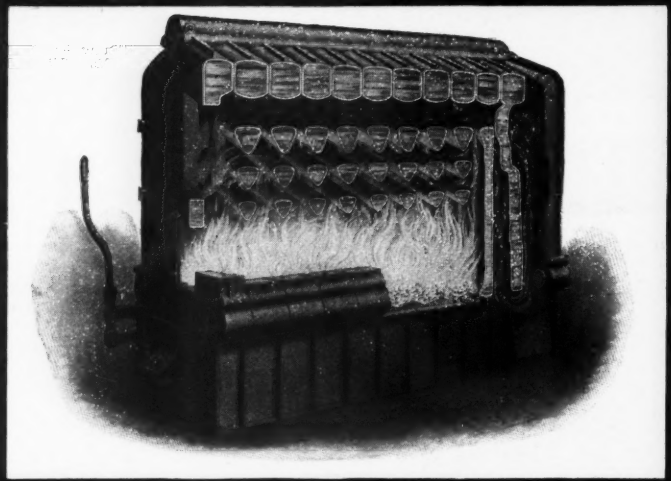
Malleable and Wrought Pipe Hooks and Straps

Complete stock of every size and kind. Quality the best that can be made. B.B. Ornamental Pipe Straps, all even, clean cut, brightly tinned. Ask for catalogue and prices.

BERGER BROS. CO. 231-237 Arch Street PHILADELPHIA, PA.

"BURNHAM" BOILERS

FOR STEAM AND WATER HEATING.



RELIABLE,
DURABLE,
ECONOMICAL,

QUICKLY SET,
TIGHT JOINTS,
EASILY MANAGED.

LORD & BURNHAM CO.,

GENERAL OFFICE AND WORKS,
IRVINGTON-ON-HUDSON, N. Y.

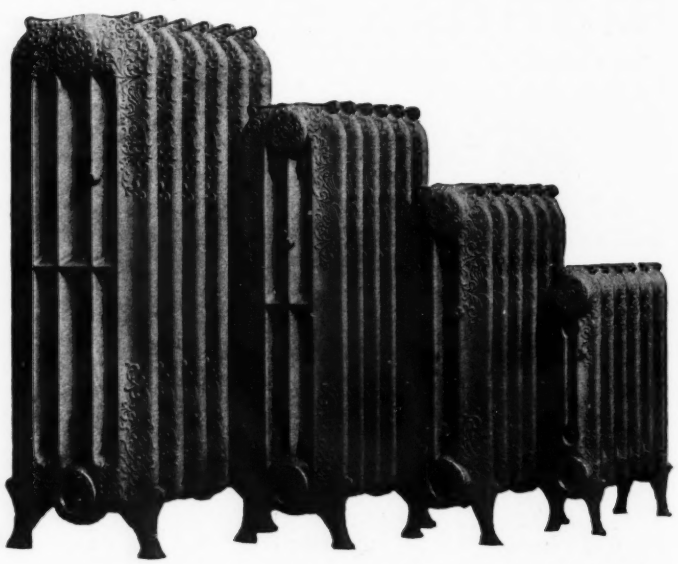
NEW YORK OFFICE,
1133 BROADWAY.

TRITON RADIATORS

We have told you a number of times about our 1, 2, 3 and 4 column

Triton Radiators

and this is the first view we have ever had of the different widths together. Our new catalogue just out tells all about all of our radiators. Ask for one.



United States Radiator Co.

Dunkirk, N. Y.

New York Offices:
1125-26 Park Row Bldg.
13-21 Park Row

New England Agency:
The Richmond Stove Co.
Norwich, Conn.

DOMESTIC ENGINEERING

Plumbing : Heating : Lighting :: Ventilating

Whole No. 139 *MAY FIFTEENTH, NINETEEN HUNDRED AND ONE* *Vol. 21, No. 2*

Plumbing and Household Sanitation—X.

A Course of Lectures which, when completed, will cover the theory and practice of the art

By J. Pickering Putnam, of Boston, Mass.

All rights reserved for reproduction

Copies of issues of Domestic Engineering containing the eight previous installments may be had at 20 cents each.

Recapitulation.

It will be useful to briefly capitulate the steps we have taken so far in this course, which seem to justify the conclusions we have reached.

We have outlined the necessity of viewing plumbing broadly as more than an art; as, in fact, a science based on many sciences, and we have seen that its proper treatment concerns not merely the individual in his private dwelling, but the whole community.

The ultimate disposal of household wastes and its nature and composition, govern the treatment which should be employed in our system of sewerage and house-piping, and fixtures. We have very recently learned how sewage may be rendered innocuous, and found that this is due to the beneficent action of certain species of bacteria, while other species and other conditions render it in the highest degree dangerous; and we have also recently learned that the dangerous conditions can be entirely avoided by a rapid and complete removal of the sewage from the premises in their fresh condition, for which reason cesspools of every kind, small and large, must be condemned; that pure air and sunlight destroy the dangerous bacteria, and that our sewers may, through the application of modern science, be so constructed and used that without great expense, the air within them may be even freer from injurious matter than the air of the streets above them, and much more wholesome to breathe than that of ordinary crowded rooms: That for this reason, the use of a disconnecting trap, between the house and the street sewer becomes, under such circumstances, worse than superfluous, as diminishing the ventilation of the sewers: and the omission of this trap enables us to dispense also with the expensive foot vent and its pipe.

We have also found that the special trap vent is unreliable as a protection for the seal of traps against siphonage, and that its secondary office of cleansing the interior of the pipe system by aeration, can far better be performed by proper flushing, and by the natural ventilation which follows the water flush.

Back Pressure.

"Back pressure" in plumbing is a force acting in a direction precisely opposite to that of siphonage. It indicates that the air in the drains is under compression, where with siphonage it is under rarification. Hence it tends to force the water of traps from the drains outwards into the house where siphonage tends to force it inwards from the house into the drains. This compression of air in the drains may be caused either by the movement of fluids in the house pipes themselves or by external influences acting upon the air of the sewers, such as the pressure of wind and tide at the sewer openings or a change in the temperature or volume of sewage within the pipes. With properly ventilated soil pipes the expansion or contraction of the air in the sewers can have no influence on the seals of interior fixture traps, but where an intercepting house-trap is used, it is clear that a sewer vent must also be furnished at the trap to protect it from such influences.

Fig. 75. Effect of Back Pressure.

Fig. 76. Back Pressure resisted by position of the Trap below the Fixture.

The influences which act within the house pipes to create back pressure, are: first, the compression of the air in the main soil pipe by waste water passing through it; second, the pressure of the wind; and third, the suction of open fires and ventilating outlets throughout the house.

If a large body of water is thrown suddenly into the soil pipes from one of the upper fixtures in a house, it drives the air in advance of it as it falls like a plug through the pipe. Were there no resistance to the passage of the air, such as is caused by friction, or a sudden bend in the pipe, the air would pass through a properly-ventilated pipe in front of the water without compression, but the rough interior of the soil and waste pipes, and sudden bends in their course causes considerable resistance to the escape of the air in advance of the water, causing condensation of the air, and giving rise to the phenomenon we are discussing, and this "back pressure" is sometimes strong

enough to drive the water out of the traps in a sudden jet or fountain. I have completely emptied a 4-inch pot trap, having a seal four inches deep, by this action, even though the soil-pipe was properly vented at both top and bottom. Fortunately, however, a very simple remedy exists for back pressure. This force never exceeds a few ounces to the square inch in properly arranged plumbing, and may easily be resisted by a column of water from 12 to 18 inches in height. Hence a trap which would be completely emptied when standing alone, as shown in Fig. 75, will easily resist the pressure when attached to and placed some little distance below a fixture or when the inlet arm is simply lengthened as shown in Fig. 76. With a common S-trap the resistance to back pressure in this figure is twice as great as in the first. The limit of resistance of an S-trap is the weight of a column of water twice as high as the depth of its seal. But though the soil pipe air may be blown through the trap when it surpasses the limit of resistance of the seal, yet the fixture above the trap will catch the water thrown up and restore it to the trap.

With a pot-trap, however, the power of resistance is much greater, since it contains water enough to rise under the influence of back pressure to a very considerable height in an inlet pipe. Now, so far as my experiments have shown, the severest back pressure that can possibly be brought to bear upon a water-trap in a properly plumbed building having ventilated soil and drain pipes, can be resisted by a column of water from 14 to 16 inches high. Hence, if a trap in such a building is placed under a fixture in such a manner that the bottom of its seal shall stand from 14 to 16 inches below the outlet of the fixture it serves, it may be considered perfectly safe against loss of seal or soil pipe air transmission by back pressure. For it will be found that if the column of water in a trap is high enough to resist this back pressure, it will entirely exclude the entrance of sewer gas or soil pipe air so compressed in the pipes. In other words, the air will not, under such circumstances, ever be driven through the water column in bubbles, as is sometimes feared. Hence in setting traps under kitchen sinks where back pressure from water falling from fixtures above is to be feared, the traps should always be placed low enough below the outlet of the sink to permit of the formation of a water column high enough to resist the back pressure. Otherwise the water may be blown out of the trap into the sink and sewer air will follow. If such action follows every time any fixture above is discharged, the constant repetition of such injection of sewer air into the room may result in serious consequences.

Now the main house trap is a frequent cause of heavy back pressure in the basement of a house owing to the friction caused by the resistance of its seal, and this furnishes another argument in favor of its abandonment.

In the experiments in back pressure made in my investigations for the Board of Health, the traps were tested on the basement floor (see Fig. 77) just above the horizontal run of the soil pipe. The tests were divided into (A) those in which the traps had no vertical extension of the inlet arm; and (B) those in which the inlet arms were extended.

An S-trap having the ordinary 6-inch length of inlet arm above the seal was first tested. The first discharge of the water closet alone threw the water out of the trap, projecting it several feet in the air, and broke the seal. The experiment was often repeated with the same result.

(A). A 4-inch pot trap lost its seal in four discharges (see Fig. 78). The top of the inlet arm stood 2 inches above the top of the seal.

An 8-inch pot lost 2 inches of its seal in seven discharges. The top of the inlet pipe stood 3 inches above the top of the seal.

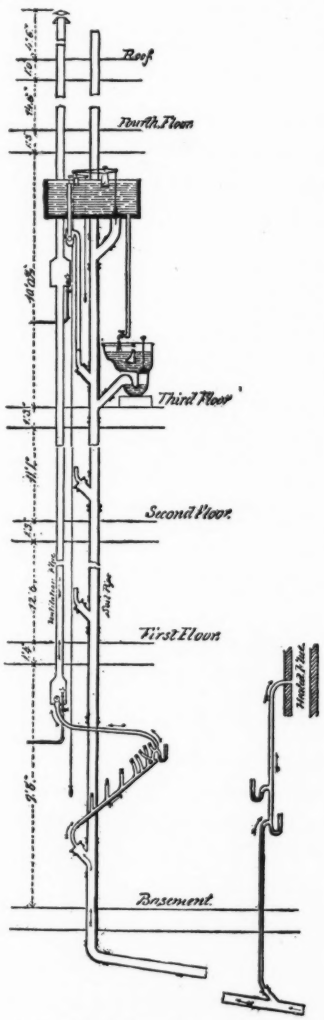


Fig. 77. Apparatus used in the Experiments for the Boston City Board of Health.

The same trap lost 3¾ inches by fourteen discharges of the water closet and bath tub together.

(B). With a vertical extension (Fig. 76) of 16-inch, an 1½-inch cast lead S-trap retained its seal entirely whether tested with the discharge of the water closet alone or with water closet and bath tub together; but in all cases air was forcibly driven through the water forced up into the inlet pipe, because the volume of water in the trap was insufficient to outweigh the back pressure.

An S-trap having 5 inches of seal without extension lost its seal in all cases, but with an extension of 16 inches the water was not thrown out under the severest discharges. With this trap, moreover, the large volume of

water was with the extension sufficient to overbalance the pressure of the air, and no bubbles were driven through the trap. The same deep seal S-trap was then tested after half its seal had been removed as by evaporation or other accident. In this case the trap acted exactly as did the ordinary shalow-sealed, ordinary cast-lead S-trap, and always allowed air to be driven through it.

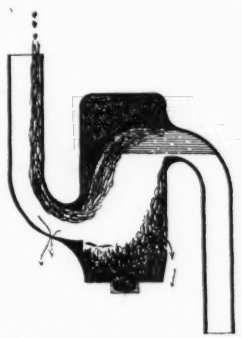


Fig. 78. Pot Trap under Back Pressure.

A 4-inch pot trap with the 16-inch extension neither lost any of its water nor allowed any air to escape through its seal under any of the severest conditions.

The same trap with a 6-inch extension, bringing the top of the extension 8 inches above top of seal, lost its entire seal in two discharges of the water closet and bath tub together. The volume of the water in the trap was sufficient, but the pipe was not long enough to allow of the formation of a column sufficiently high to resist the air pressure.

An 8-inch pot-trap with either a 9, 12 or a 16-inch extension lost no water and allowed no air to pass under either of the tests. But with a 6-inch extension the water was driven out of the trap.

A piece of 1½-inch waste pipe, 12 inches long, holds about ¾ of a pint of water. A 15-inch piece holds a pint. Hence a trap used with such a waste pipe should have a capacity not less than ¾ pints.

In our apparatus erected for this course, we shall be able to illustrate "back pressure" in every degree of force, from an amount scarcely measurable up to that which will throw the entire contents of our tank upon the lecture floor, according as the valve just below the trap testing branch be left open or completely closed.

Evaporation.

With unventilated traps evaporation of their seal goes on with extreme slowness, and with such traps containing a considerable body of water, no danger from this cause need be anticipated unless the building be left unoccupied and unwatched for years at a time.

If the trap is adequately ventilated, however, its seal will be gradually lowered, and if the ventilating flue connects with the trap at or near the crown, the induced air-current licks up the water with a speed proportional to the efficiency with which it performs its duty as a ventilator, and will destroy the seal of an ordinary small S-trap in from four days to one or more weeks, according to the rapidity and dryness of the current. If the flueconnect with the trap at any point, it is powerless to prevent self-siphonage.

Some years ago, after the enactment of the trap vent law, the Brooklyn newspapers published, in the interest of the public, the following warning, showing that the officers of the Public Health Department had already experienced some of the evils of the trap-vent law: "The Commissioner of Health desires to direct the attention of householders to the danger of occupying houses which have been for any considerable time without occupants. It is the practice of many persons to leave their dwellings for several months in the summer, during which time the water in the traps of basins and other fixtures is liable to evaporate, and thus permit the unobstructed entrance of sewer-gas into the dwellings. When the families return in the fall, they are exposed to these sewer emanations, and it is believed that cases of serious, if not, indeed, fatal sickness have been due to this cause. Whenever houses are so left, provision should be made to have the traps filled at least every two weeks by a competent and trustworthy plumber, and if possible to have all the windows of the house opened for twenty-four hours before its re-occupation." This notice was given the public after the city had fastened upon them the trap vent law. They then felt constrained to advise every house owner, under peril of serious danger to health, to employ some honest and skilful expert to stand constantly on the alert to undo the danger done by this law. We will not calculate here the number of traps owned by the several million inhabitants of Greater New York, nor the exact size of the army of trustworthy plumbers which would be required to overhaul dwellings for the purpose of attending to apparatus intended to be made by the new law automatic. But were all the traps ventilated in accordance with this law, it is certain that their fortnightly refilling and the opening of all the house windows in consequence of their not having been refilled weekly, would consume infinitely more time than would be required to clean out the same number of unventilated pot-traps, if their use was the only alternative, as often as their condition required, and, as a collector of greasy sediment, the vent pipe is no better than an elongated cesspool trap itself.

Experiments for the Board of Health on Evaporation produced by Back Venting.

These experiments were made on the basement floor. They were subdivided into (A) those in which the vent pipe was conducted into a cold flue, and (B) those in which it was conducted into a heated flue.

(A) Tests with a cold ventilating flue. A 1¼-inch S-trap having a seal 4⅝-inches deep, was attached to the end of the branch waste in the manner shown in Fig. —. A 1½-inch rubber ventilating pipe was taken from the 1¼-inch ventilating opening at the crown of the trap, and conducted into a cold 4-inch galvanized iron ventilating flue, shown in the drawing. This flue passed through two occupied offices (basement and first floor), whose temperature was maintained at about 68 degrees F. during the term of the experiments, and through a chemical laboratory (second floor), whose temperature was maintained at about 60 degrees F. For the remainder of its height the flue passed through a cellar and stairways, whose temperature was maintained at about 45 degrees F.

No artificial heat was applied to the flue. The velocity of the movement of the current of air in the flue was measured by the anemometer. The daily rate of loss of seal by evaporation, and the velocity of the current in feet per minute is shown in Fig. 79.

We see that the loss averages about an eighth of an inch per diem. It amounts to about a quarter of an inch the first day, and gradually diminishes as the level of the water descends in the trap, and the distance of its surface from the ventilating current increases, to a little less than ⅛-inch per diem. Hence an ordinary S-trap having an 1½ inch or a 1¾ inch seal might lose its seal in from nine to eleven days under similar conditions.

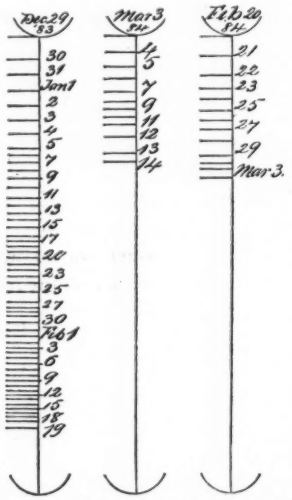


Fig. 79. Records of Evaporation with Cold Flues.

The experiment was repeated several times at different parts of the year from the middle of December to the middle of May, with substantially the same results.

Fig. 79 represents the record of these experiments.

The same trap was now tested at the middle opening whose center was 2 inches below the crown. The rate of evaporation was somewhat slower as shown. This experiment was carried on only 11 days, inasmuch by this time 1½ inches of the seal had been destroyed, and the seal of many ordinary S-traps does not exceed 1½ inches or 1¾ inches. The same trap was now ventilated at the lowest point, i. e., 6 inches below the crown. The evaporation in this case was exceedingly slow, and after the first two or three days was almost inappreciable.

A number of experiments were then made on S-traps unventilated, but open at both ends as is the case in practice. The loss of water was almost inappreciable, not exceeding 1-32nd or 1-16th of an inch in ten days.

(B) Experiments on Evaporation produced by a Heated Ventilating Flue.

A 1½ inch trap having a seal 3¼ inches deep was tested A 1½-inch wrought iron gas pipe 6 inches long connected with the crown of the traps with a brick flue 8x12 inches heated by a stove. (See figure 80).

The diagrams shown in Fig. 80 represent five tests. two made in March, one in October, and two in November. Here again the perpendicular lines represent the depth of seal of the trap. The upper arc represents conventionally the outlet mouth, and the lower arc the inlet mouth of the trap. The horizontal lines show the position of the water level in the trap at the same hour in the morning of each day recorded in figures on the diagram. We see here a very rapid diminution of the seal. The average loss per diem exceeded 1-3d of an inch. The smallest loss is ⅛ inch, and the largest nearly ⅞ inch. The fixture side of the trap was closed during the tests.

A second series of experiments was made with an ordinary 1½ inch cast-lead trap having a seal 1½ inches deep. The trap was connected with the heated flue at a point 3 inches below the crown. Four tests were made.

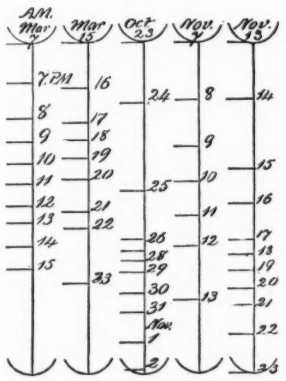


Fig. 80. Record of Evaporation with Heated Flues.

The loss of seal was much slower than in the former tests because of the distance of the mouth of the vent pipe from the top of the water. The rate of evaporation, however, in these four tests averaged one-seventh of an inch a day, the greatest loss in any one day being ⅜ inch. In all these experiments on evaporation it was found to make no material difference in the results whether the fixture end of the trap was open or closed, showing that the evaporation at this point was inappreciable.

In the experiments on evaporation with the cold ventilating flue, in the first experiment with the vent at the crown, the anemometer recorded an average rate of movement of the ventilating current of 94 feet per minute.

In the second test with vent at the crown the average was 85 feet per minute; with the vent 2 inches from the crown the average was 109 feet per minute. The velocity of the current during the cold months of the year was quite uniform. In the summer months, however, it was exceedingly variable, sometimes equalling that of the cold season, and sometimes ceasing altogether, or retrograding. In the cold months the relation between the rapidity of evaporation and the velocity and dampness of the air—current was not accurately determined, the rate of evaporation being quite uniform in spite of considerable barometric fluctuation and change of velocity.

But in summer a change of the conditions of the atmosphere produced a very marked change in the rate of evaporation. On a few occasions of damp or rainy weather in

the summer months, where the cold brick flue was used without a ventilating cap on top, the seal actually gained slightly in depth from condensation on the cold flue of the damp air of the soil pipe, or from an actual descent of moisture down the chimney. These accretions, however, were very rare, not occurring more than three times in the whole duration of the experiments.

The scientific investigation of this branch of the subject would require more elaborate apparatus and much more time than was at our disposal; yet what records we made were made with great care and accuracy.

From these experiments we found (1) that a rapid evaporation of the water seal of traps takes place when they are ventilated at or near the crown, and that the evaporation goes on both in winter and in summer, and in ordinary unheated flues, as well as in flues artifically heated. The evaporation is most rapid in winter or with flues artificially heated, and slowest in summer, especially in damp weather. Hence it may be stated generally that the rapidity of evaporation depends upon the velocity, temperature, and hygdometric condition of the atmosphere. (2) That in winter the evaporation produced by ventilation is so rapid as to destroy the seal of an ordinary 1½-inch machine made S-trap in from four to eleven days, according to the nature of the current.

(3) That without ventilation, or with the ventilating flue taken from a considerable distance below the crown, the evaporation of the water seal of traps is exceedingly slow, and that unventilated traps having a considerable water capacity may be considered perfectly secure against this danger unless they are unused for years at a time.

It would obviously be impossible to devise a form of apparatus for experimental purposes which should cover all the varying conditions liable to be met with in plumbing practice. The position of the trap on the soil-pipe branch, the manner and position of connection of the branch with the main pipe, the amount of usage the pipes sustained, the manner in which the ventilating flues were constructed, would all produce their effects upon the results. Nevertheless, in every case where the ventilating flue performed the office of producing a movement of the air within the pipes for which it was intended, and this air was not absolutely saturated with moisture, an event very rare in well ventilated sewers and house drains, the evaporation must of necessity go on in the manner recorded as the result of these experiments.

How far the variation of the conditions would effect the rapidity of the loss of seal must be left to the investigators to determine, and it is hoped that the National Board of Health will at some early day take up this whole matter, and by a most thorough and judicial series of exhaustive experiments, put a final end to all doubt and discussion on the part of the public in this extremely important department of sanitary building.

The apparatus used in our tests for the Boston Board of Health was fitted up exactly as is customary to fit up plumbing for actual use.

The entire length of the soil-pipe was kept much of the time wet during the experiments on evaporation, by discharges through it made for the tests on siphonage and back pressure, precaution being of course taken by having the inlet end of the trap always corked up so as to be secure against loss of seal through these agencies. The inlet at the end of the soil pipe system, where the fresh air was taken in to produce the ventilating current above the trap, was distant as much as 60 or 70 feet from the traps tested, so that the air was obliged to traverse a considerable length of damp soil pipe, the greater part being nearly horizontal, on its way to the trap, and it may therefore be assumed it was conducted over as large an area of moist surface as it would ordinarily encounter in practice.

Moreover the results of our experiments in this direction correspond with the experience of many sanitary engineers, health inspectors and plumbers who have had occasion, since the enactment of the plumbing laws in various parts of the country, to observe the effect of the provision requiring branch ventilation on the water seal of traps.

General Conclusions from the Experiments on Siphonage, Back Pressure and Evaporation.

From these tests I conclude as follows:

(1). The ordinary form of machine-made small S-trap with shallow seal and without special ventilation is incapable of resisting the action of siphonage or back pressure, even in a very mild form.

(2). A small S-trap even when made of unusually deep seal is incapable without special ventilation of resisting the action of siphonage or back pressure in a mild form.

(3). Small S-traps when ventilated at the crown, with vent-pipes having a diameter the full size of the bore of the trap, and of no unusual or excessive length, are incapable of resisting the severe action of siphonage produced by the simultaneous discharge of certain forms of plunger water closets, and ordinary bath tubs under ordinary conditions likely to be encountered in practice. Water closets producing a powerful flushing of the soil pipes when discharged should not be prohibited on account of their siphoning power, because the periodical flushing of the soil pipes by their use is productive of great good, and their siphoning action may be counteracted by other means.

(4). Special trap ventilation when the vent pipe is applied at or near the crown of the trap induces a current of air over the water which rapidly destroys the seal.

(5) Trap ventilation, when the vent pipe is applied at a point so far below the crown as to avoid the danger of evaporation, leaves the trap open to the danger of self-siphonage, as well as of severe siphoning action. The position of the vent pipe on the trap does not (at least within the limits covered by our experiments) materially affect the action of siphonage.

(6) Pot traps of the ordinary sizes are incapable, without special trap ventilation, of resisting the severest action of siphonage liable to be encountered in plumbing.

(7) Pot traps of the largest size are open to the objections attending all cesspools, and should never be allowed.

The Plumber in His Relation to Sanitary Progress as Viewed from the College of Practice.

By James Allison, of Cincinnati.

THE savage has no need of plumbers or sanitary engineers; the forest is his water-closet, and the rivers his bathing places. His successor, the agriculturist, who settles in permanent habitations, is content with a high stump, or earth-closet; fills a trench with gravel for drainage, needs no sewer, and digs a well or cleans out a spring for water. But so soon as man begins to concentrate in towns and cities, he is confronted with a series of natural laws which compel him to devise some means, not only to get rid of the offal and waste, but also of securing sufficient supplies of proper water and air.

History has not been able to point out when man commenced this work of providing against disease and discomfort, for the most ancient people who erected cities, were more munificent and thorough than we in their arrangements for water, sewage and drainage. In Pompeii were found water-closets of marble, elaborately carved, and constructed on correct principles for convenience and efficiency. These things were the results of an imperious necessity, in order to preserve the health of man in large communities. They were called sanitary, and meantime the improvements in machinery for manufacturing lead into pipes and sheets had brought that metal into general use, and the workers came to be called plumbers (from the Latin word plumbum, lead). As the world advanced in industrial arts, and cities increased in population, it is easy to see that the responsibilities of the plumbers would also multiply, and if he was as faithful to his trust as other artisans are expected to be, we should find him keeping in the front rank of sanitary progress. It has been no easy task for him to apply correctly the principles of sanitary science, and at the same time meet the views of a parsimonious builder, or the caprices of owners whose fancies not infrequently are inimical to a safe system of drainage, although, in any event, they never fail to hold the plumber responsible.

Another point I would like to call your attention to is the proper ventilation of our homes. The big back log in an open fireplace of a log cabin, left but few problems of this kind unanswered; but with the water service of today and its attendant closets, sinks, soil-pipes, traps, sewerage and drainage, came also steam, furnace and stove heating, involving new necessities for ventilation; and the plumber in his ascent in the rugged path of evolution found himself confronted with another obstacle, about which he knew as little as he had once known of water and air, all of which the intelligent plumber of today is supposed to know, and be able to provide against. Nothing is more calculated to elicit the admiration of a curious world than the alacrity of the public to hold him responsible and the Christian humility with which he bears his burden.

Shall we, to whom the people look for knowledge, ability and honest dealing, be found arrayed on the side of the evils, or against them; and when the public discover that our integrity has been weighed against a few dollars discreditably earned, and found wanting, what will the verdict be? My views upon this subject are to render ourselves masters of sanitary science, and then make our work correspond to its highest requirements. It is a public, as well as our own, misfortune, that cheap people, proprietors, builders and plumbers, have been able to perpetuate the evils of ignorance and faithlessness. The road of reform has been and will be a hard one to travel; but with united efforts in behalf of a long-poisoned and much-abused public, and our equally-abused craft, we have strong hope of success. Where can such a trinity be found whose common object is the public welfare—without grounds for personal jealousies, and whose professional interests do not clash—as architects, doctors and plumbers, whose motto can be, "all for each and each for all," a happy combination of the classic and mechanic arts, under the leadership of science. To the architect and builder we look for the plans and specifications whereby science shall be wisely and tastefully applied to the convenience, use and health of man; but in order to secure these we are compelled to refer to medical science for the accumulated experience which enables us to select healthful locations, and provide the necessary sewerage and drainage, and obtain the proper ventilation and pure air required. It is only by the aid and counsel of the doctors and builders that the sanitary plumber is able to accomplish his part of the duty. "As unto the bow the cord is useless, each without the other," so the architect and builder are to the plumber and to the doctor; each takes from each to make the artist, who applies with skill the science he acquires from the other. I cannot too often nor too clearly express my feeling of satisfaction that ministers of science and art, at the threshhold of whose temple we have worshiped, are awakened to the evils by which we are beset, and are in arms to provide remedies. In the cities of the old world this question has been fairly settled, and sanitary work in cities, covering the water and food supplies, the correct ventilation and plumbing of houses, supervision of tenement houses and workshops, and proper police regulations in regard to sanitary matters, have reduced the sickness and death rates (of the larger cities) over 30 per cent. Such is the experience everywhere, and it is not necessary to repeat the catalogue of diseases against which sanitary laws must be provided and against which all the science and philanthropy in the world are powerless, without laws and the powers to enforce them. The question is no longer as to the existence or nature of the evils but the remedy, and the best methods of applying it. New York and Brooklyn and other eastern cities are fully aroused and have already taken steps in the right direction, and already the beneficial effects of laws to compel correct sanitary regu-

lations are showing themselves in the increasing activity of health boards, the better construction of houses, and, above all, in the dignity and comprehensiveness of the plumbing trade, which is taking its place among the arts and will in time be ranked among the professions.

It is surprising how soon one will learn to build correctly, when the arm of the law is stretched out over him. Let the law prescribe what shall and what shall not be done, with sufficient penalty for violations, and the education of plumbers and builders will be easy. We have no hesitation in making laws to govern the apothecary, upon the ground that he is dealing with affairs of life and death, or designating who shall administer medicine for the same reason; yet the yearly mortality arising from the criminal neglect, or ignorance, of the simplest laws of health on the part of those upon whom the responsibility rests, outnumbers the others ten to one. I invoke the power of the law as a teacher and monitor of the people and those who do their work; let us act openly and boldly; let the opposition come as it may, we have nothing to fear. We cannot lose, and have everything to hope. I believe with Hellyer, the best practical authority we have on English sanitation, that sanitary science, notwithstanding the earnest endeavors of its medical and architectural experts, will be shorn of half its strength until the class that performs the mechanical work is instructed in the reasons for what they do. Hellyer says there are a 'thousand gates to death' and 'few are wider or open more readily than those in our own homes when unlocked by noxious gases from foul drains.' Who can number the deaths or estimate the diseases caused by polluted water tanks, brick cesspools, diseased water-closet traps, a bottled-up soil-pipe, or bell trap? Death is not dealt boldly and openly by soil-pipe air; it never warns you like gas, but steals in after a cowardly fashion and kills slowly an inch at a time. These are some of the reasons why knowledge should be not altogether confined to sanitary and medical experts; in the system I would approve there should be a line of promotion so provided that the grimy helper of today could become a master-plumber sanitary-expert of the future. But let us first secure a code of wholesome sanitary laws and begin the work.

Catch Basin Construction in Chicago.

WOODEN man-hole covers were in general use prior to the year 1879. For the eighteen years preceding that date the average cost of maintaining these covers was 38 cents each. In his annual report for the year 1878, Benezette Williams, principal assistant engineer, urged the adoption and use of iron covers. A standing objection to any municipal improvement then, as well as at the present time, was the cost. Mr. Williams sought to show that it would be economical to use iron covers rather than wood, and presented the fact that the cost of each wooden cover—38 cents—was equal to the interest on $5.40 at 7 per cent per annum, hence that, if $5.44 were added to the cost of wooden covers, a permanent cover needing no repairs or renewals, could have been obtained and would have been equally economical. Wooden covers were then costing a little more than $5; if permanent covers could be obtained at any price less than $10.40 it would be wise to adopt them, "to say nothing of the greater satisfaction and safety attending their use." But covers of a good quality of cast-iron could be had at a cost not exceeding $10. In accordance with Mr. Williams' recommendation the use of iron covers was inaugurated in the following year and 998 were substituted for wooden covers, at an expense of $7,332.46—not including 1,136 open iron covers on man-holes and catch-basins for ventilating purposes, costing $3,568.71.

The question of ventilating the sewers through grated man-hole covers was first suggested by Mr. Williams, and a small appropriation was made by the city council in the year 1878 for this purpose; nothing was done, however, until the following year. The argument advanced by Mr. Williams for the perforated covers was that "the general application of street ventilation will unquestionably greatly reduce the amount of sewer gas which gains entrance to our dwellings, and thereby prevent much of the actual evil which now results therefrom, and in a measure tend to allay the uneasiness felt by the public in regard to the subject;" and he referred to certain European cities where ventilation is secured through the catch-basins, and without alleged objection.

There is no doubt that it would be desirable to have a thorough ventilation of the sewers at the surface of the streets, rather than to confine the gases. The gases generally in a sewer are, probably, not seriously harmful unless confined; once in contact and commingled with the oxygen of the air their power for evil seems to be destroyed, unless, perchance, they convey the "germs" of some contagious disease. Indeed, it is much to be preferred that these so-called "germs" should be let loose in the unconfined and pure air of the street than that they should be led, or forced, into houses through inefficient traps and defective joints. But this ventilation must be general to give entire satisfaction. People are governed by prejudices, largely, and the rule applies in this as in other matters. The fear of sewer gas escaping from a ventilated sewer through a man-hole or catch-basin cover is usually groundless, but it has led to amusing circumstances. The sewer department was implored by a citizen on one of the avenues, who had seen a perforated cover take the place of a tight one on a catch-basin, to have the old cover replaced, as the odor which escaped and invaded even his house at all hours of the day and night was absolutely unendurable; he was also in great fear lest the health of his household should be impaired. The department readily assented; no further complaint was heard, notwithstanding the fact that the perforated cover was again substituted within a week—quietly, of course, and without the knowledge of the offended house-

holder. This circumstance has been repeated over and over again, always with the same result. Discretion is used by the department in this matter, and as little cause for complaint given as possible; but it would surprise most of the residents of Chicago if they knew to what extent the sewers of the city are breathing their gaseous emanations directly into the streets; and it would also be a reason for gratitude on their part if they also understood how the sewer department had thus defended them against invasions of pent-up sewer-gas directly into their houses.

Man-Holes.

All man-holes are now built circular in section. For some reason, not well founded, it would seem, a few were originally made in oval shape. This led to annoying confusion and delay; whenever a report of a broken cover came to the office of the sewer department and had to be replaced, it was necessary to look up the record of the construction of the particular man-hole in question to learn what kind of a cover to send out. The oval shape has been discontinued. All man-holes are three feet in internal diameter. They are built with two rings of brick, thus giving a thickness of eight inches to the wall. The bricks in the inside ring are set vertically. The outer ring is built of "bats," so far as the broken brick will go; otherwise, whole bricks are used, set as in the inside ring and breaking joints with it. Up to the time when iron covers were first used the walls of the man-holes were only one brick in thickness. Such man-holes, still in existence and on main streets, where there is the heaviest traffic, seem to have all the strength required of them; as a matter of precaution, now that the iron covers are largely used, the walls are made of double thickness. The top course of bricks, in all cases, consists of whole bricks, laid as leaders.

On unpaved streets the tops of the man-hole covers are placed four inches lower than the surface of the streets; on paved streets, one inch lower. Where wooden covers are to be set the top of the man-hole is

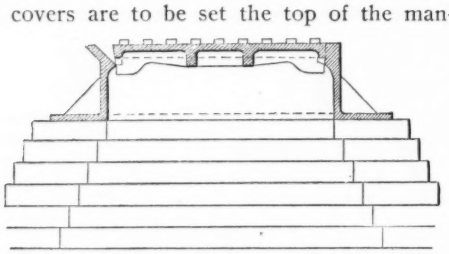


Fig. 1.

two feet and eight inches in diameter, the walls being drawn in by two header courses, decreasing the diameter two inches for each course; but where iron covers are set the top is two feet in diameter, the walls being drawn in by means of twelve header courses laid horizontally, decreasing the diameter one inch for each course. The construction of the upper part of a man-hole, with iron cover and support in place, is shown in the accompanying diagram—Fig. 1. This is the closed cover with small projections affording a foothold for horses. Fig. 2 shows the same cover looked at from above. Man-holes are placed at all intersections, and the distances at which they are placed between intersections are governed by the sizes of the sewers. Over pipe sewers—two to two and one-half feet in diameter—they are not allowed to be more than 140 feet apart, and usually not less than 100 feet; over three-foot sewers, the limit is 165 feet, and over those from three and one-half feet in diameter upward, 300 feet.

Excavation.

By the specifications under which the sewers of Chicago are constructed, the trenches are excavated in such directions as required (in the middle of the street), and to the depths necessary to secure the proper grades. In wet trenches that require to be sheeted, and where provision is to be made to keep the sewers dry during their construction, the widths of the trenches for the brick sewers inside

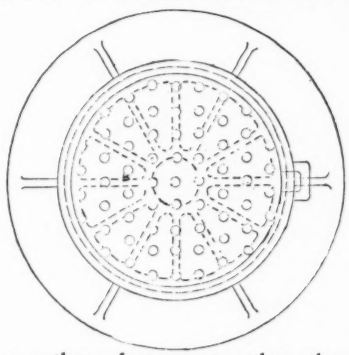


Fig. 2.

the sheeting are three feet greater than the outside diameter of the sewers. For twelve and fifteen-inch pipe sewers, sheeted trenches are not less than five feet in width. In dry trenches, where no provision is made to protect the work from water, and that do not have to be sheeted, the width of the trenches is such as to permit of the construction of the work in the manner and size as specified. Wherever the nature of the ground admits, the bottom of the excavation has the shape and dimensions of the outside of the lower half of the sewer. In order to secure this, the contractor is required to provide a pattern or form, made with two segments, one to fit the outside and the other the inside of the invert. This is firmly and securely set to the proper grade, by the stake given by the engineer, and remains unmoved in its position until after the masonry is laid. The bed for the sewers is then brought to the required shape, by trimming, with suitable tools, to a line stretched from the outside of the masonry to the form.

The material excavated is deposited on the side of the trenches, beyond the reach of slides. The banks are kept trimmed up, so as to be of as little inconvenience as possible to the public travel, or to tenants occupying adjoining property. In case the street is not wide enough to furnish room for deposit without obstructing the sidewalk, the contractor is required to erect and maintain, in front of all buildings, a suitable barrier, to keep the earth off at least three feet of the inner portion of the walk.

Where rock is encountered in excavating the trenches, it is removed by drilling and blasting, or otherwise, to the surface of the outside of the bottom of the sewer. Whenever a main water or gas pipe crosses the line of the trench, the rock on each side of the pipe, for a distance of five feet, is removed without blasting. Where blasts are being made, the trench is carefully covered with suitable brush or timber, to prevent danger to life and property.

A History of Water Closets—V.

From "A Book on Water Closets," by Glenn Brown, of Washington, D. C.

AMONG closets that have hinged valves, or valves working on a spindle, I find one type in which the valve opens upward, another outward, and another downward in a direction relative to the bowl of the closet. Taking under consideration first the closets in which the valves open upward or toward the bowl, I find the first invention of this type was made in Great Britain in 1825, by J. Downton, for what he calls a "pump-closet." In this closet the matter in the bowl is drawn by the upward action of the piston into a cylinder, where it is retained by a valve that opens only in an upward direction. When the piston is pressed down by a handle, the fecal and other matter is discharged in any direction that may be desired. The return to the cylinder of the matter discharged is prevented by a flap-valve opening only in an upward direction. To enable the piston to work easily, the cylinder has an air-inlet near the top. The supply-valve is connected with the handle that works the piston.

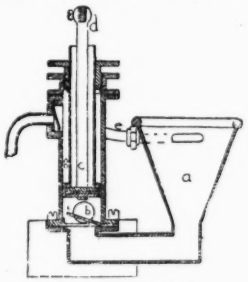


FIG. 47.—Section.

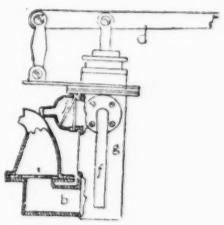


FIG. 48.

SAND'S CLOSET.

a, Bowl. *b*, Discharge-pipe. *c*, Piston. *d*, Lever. *e*, Supply. *f*, Air-pipe. *g*, Cylinder. *i*, Valves.

Sands' Closet.—In the United States, in 1874, one Sands invented a closet of this type that is very similar to Downton's. This device is also intended to be placed below the water-line or the point of discharge. By raising a lever, the excrementitious matter in the bowl is drawn by the suction of a piston directly into a cylinder. When the lever is pressed down, the waste matter may be discharged in any direction required, through the soil-pipe previously placed in the proper position. The flap-valves, of which there are two, opening in an upward direction, prevent the return of the waste matter to either the bowl or the cistern.

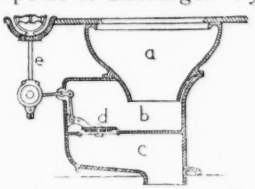


FIG. 49.—BLACKWOOD'S CLOSET.

a, Bowl. *b*, First receiver. *c*, Second receiver. *d*, Valve. *e*, Hand-pull.

Blackwood's Closet.—I note, as the only instance of this type of closet being intended for general use, one invented in this country by W. Blackwood in 1881. In this closet the matter which drops into the bowl would go directly into a large compartment or receiver. The valve is opened upwards by means of a combination of levers connected with the hand-pull. When the valve is raised, the water and excreta would find their way into a second receiver. The first compartment, which opens directly into the room through the bowl, would without doubt get and remain in a very filthy condition.

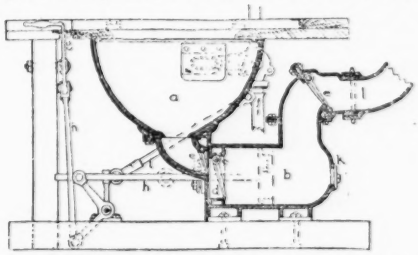


FIG. 50.—Section.—BUNNETT'S CLOSET.

a, Bowl. *b*, Piston chamber. *d*, Piston. *e*, Valves. *f*, Supply-pipe. *g*, Hand-lever. *h*, Piston-rod. *i*, Rod for supply-valve. *k*, Inspection-hole. *l*, Soil-pipe. *m*, Fan. *n*, Connecting-rod.

Bunnett's Closet.—The first closet invented with a valve which opens in a direction outward from the bowl was designed by an English engineer named Joseph Bunnett, in 1846. This closet was designed to be placed below the water-line or point of discharge.

This closet appears to be simpler in its construction than the Downton closet, and for that reason would be better for the purpose which that is intended to fulfil. The outlet at the bottom of the bowl and the piston which works in the receiver both have flap-valves, which open from the bowl in an outward direction. The waste matter from the bowl will descend into the receiver by the action of gravity; thence it would be forced by the action of the piston through a third valve into the soil-pipe. The last-mentioned valve is for the purpose of preventing the return of the discharged matter into the receiver. The outlet of the soil-pipe may be carried in any direction desired. In this manner the discharge of the excreta may be governed to suit circumstances. Water-closets of this type may in rare instances become necessary; for instance, in

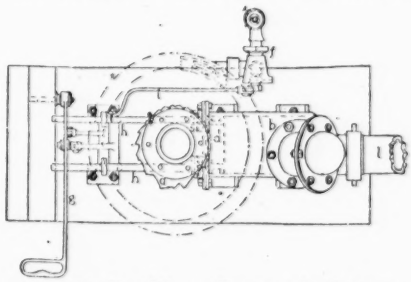


FIG. 51.—Top View.—BUNNETT'S CLOSET.

cases where it is required to put a water-closet below the point of connection with the sewer.

When used it would be advisable to run the soil-pipe higher than its point of juncture with the sewer, so there could be no back-flow from the sewer in case the valves should leak—and valves of this kind are liable to leak at the most inopportune time.

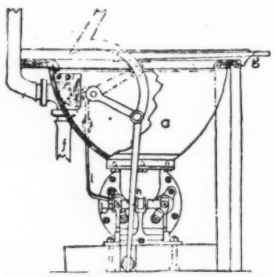


FIG.—52.—Side View.—BUNNETT'S CLOSET.

Armstrong's Closet.—In 1848 a closet of this type and class was patented in England by John Armstrong. The novelty in this closet consists in the manner of opening the valve, by means of a slotted quadrant and cam. The valve is lifted by a cam attached to a vertical rod, the cam being bolted to the rod so that the valve will be lifted when the cam is turned on its greatest axis.

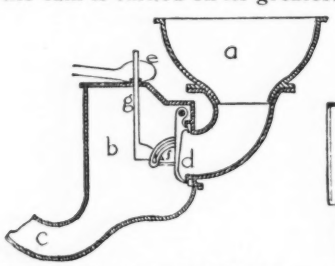


FIG. 53.—ARMSTRONG'S CLOSET.

a, Bowl. *b*, Receiver. *c*, Trap. *d*, Valve. *e*, Cam. *f*, Slotted quandrant. *g*, Connecting-rod.

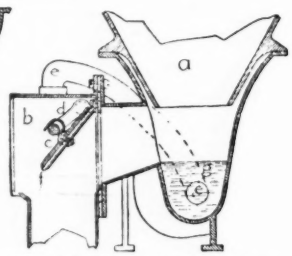


FIG. 54.—FEILDING'S CLOSET.

a, Bowl. *b*, Receiver. *c*, Valve. *d*, Crank. *e*, Overflow. *f*, Washer. *g*, Trap to overflow.

Feilding's Closet.—Another English patent was taken out for a closet, in which the valve opens outwardly, in the year 1855, by Fletcher Feilding.

There is a reservoir below the bowl that forms a water-seal trap for the overflow. This reservoir would become very filthy from deposits and stagnant water, as there is no means of flushing it. The valve has a leather washer, and is lifted by means of a crank that works in a U-shaped attachment to the valve.

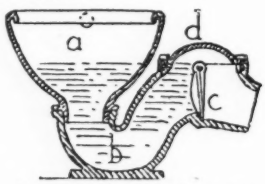


FIG. 55.—BEAN'S CLOSET.

a, Bowl. *b*, Trap. *c*, Valve. *d*, Inspection-cover.

Bean's Closet.—Bean's closet, used in Scotland, may properly be classified as one of this type of valve-closets. The valve seems intended only for the purpose of retaining a large amount of water in the bowl, so that by opening the valve quickly the whole amount would be discharged suddenly into the soil-pipe, for the purpose of scouring it more thoroughly. There is an opening above the valve which is an overflow. This closet is simply a short hopper-closet with its trap, the valve being placed where the trap discharges into the soil-pipe.

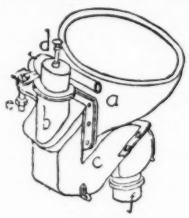


FIG 56.

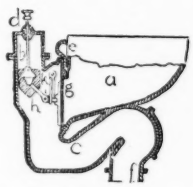


FIG. 57.

DUMMIS'S CLOSET.

a, Bowl. *b*, Valve-compartment. *c*, Trap. *d*, Hand-pull. *e*, Supply-pipe. *f*, Soil-pipe. *g*, Valve. *h*, Weight. *i*, Connecting-arm. *k*, Hinge.

Dummis's Closet.—F. Liger, in the French work on water-closets, urinals, etc., published in 1875, describes, among other closets, a valve-closet of this type, which he tells us was at that time (1875) in common use in France. This closet has a chamber or compartment at one side, very similar in appearance to the ones used in connection with plunger-closets. In this chamber there is a weight attached to the rod of the hand-pull and connected with the

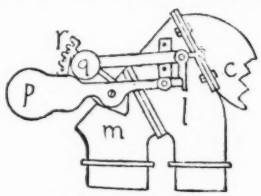


FIG. 58.—Side View.

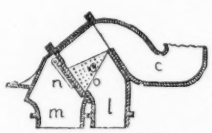


FIG. 59.—Section.

DUMMIS'S CLOSET

Device for dividing liquid from solid excretra.

c, Water-closet trap. *l*, Soil-pipe for liquid matter. *m*, Soil pipe for solid matter. *n*, Valve. *o*, Perforated plate. *p*, *q*, *r*, Combination of weights and levers for valve.

valve by a short hinged arm. The weight, which moves only in a vertical direction, keeps the valve pressed tightly against its seat, and unless the weight is lifted, it would be impossible for the valve to open. F. Liger says of this closet, that it is one of the best, uniting all the conditions required for health, and that it is odorless. I can see no

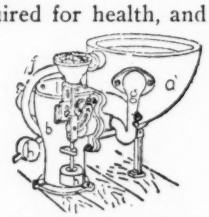


FIG. 60.—Perspective.

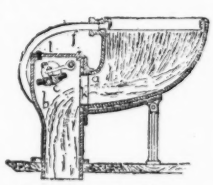


FIG. 61.—Section.

DOULTON'S TRAPLESS CLOSET.

a, Bowl. *b*, Valve-compartment. *c*, Valve. *e*, Vent. *f*, Supply. *g*, Overflow. *h*, Weights. *i*, Flushing-rim. *k*, Valve-seat. *l*, Removable cover. *n*, Valve crank.

reason why it is exempt from the faults of the class to which it belongs.

Dummis invented, in connection with his closet, a device for separating the liquid from the solid excreta. At

the point where the trap enters the soil-pipe it is divided into two branches. A grating or perforated plate is placed over the outlet nearest the closet, while a valve opening outward closes the one furthest from the closet bowl. This valve is held in position by two weighted levers. When the waste matter is discharged from the bowl, it passes through the trap, but is checked by the valve and stopped directly over the grating. The liquid matter would then pass through the perforated plate into the branch of the soil-pipe nearest the closet bowl, leaving the solid matter to be discharged into the other branch of the soil-pipe by opening the valve. This would be accomplished by raising the weighted levers on the outside. By thus dividing the liquid from the fecal matter, its manurial qualities can be more easily utilized, and I find that the French inventors almost invariably have this point in view in making their inventions. This practice must often be a detriment to comfort by reason of the unpleasant odors generated, and to cleanliness and health, for as soon as the liquid matter is separated from solid matter, all the scouring and deodorizing qualities of water are lost. The soil-pipes must become very foul, as the solid excreta passes, in many instances, through several stories before reaching its final receptacle in a large barrel or iron can (Fosse mobile).

Carr's Side-Outlet Valve-Closet.—W. S. Carr received letters patent in this country for a closet similar to the French closet in the arrangement of the valve and the weight which holds it in position.

Doulton's Trapless Closet.—Probably the best of this type, and I think the best valve-closet, provided it has a siphon-trap below it, properly vented, is the "trapless" closet manufactured by Doulton & Co., Lambeth, London. This closet has a flushing-rim that gives an equal distribution of water to all parts of the bowl, by means of small holes in the rim which encircles the top of the bowl. The manufacturer says: "The construction of the closet renders the usual complication of levers, both for the supply and discharge valves, unnecessary, as both are worked from the same spindle with direct action at each end, a very small weight being necessary to render the discharge-valve tight." There is a metal rim for the valve to fit against, while the valve has a yielding substance, such as rubber, where it comes in contact with the seat, and an earthen face.

The overflow from the bowl to the valve-compartment is sealed by a U-trap. The bowl is furnished in different ornamental patterns and attached to an iron receiver or valve-chamber by means of bolts. The perspective view shows the simplicity of the mechanism. The hand-pull is connected to the spindle, which turns the valve by a slotted crank. The weight which holds the valve in position is attached to the lower end of the pull-rod. The valve-chamber of this closet has a large vent-pipe, and a cover held on by screws that may be easily removed for the purpose of cleaning out this compartment. It is important that these inspection-covers should fit air-tight; when once removed, they are generally put back in a careless manner, and in the case of a trapless closet this would allow free communication between the soil-pipe and the house. Doulton's closet can receive its water directly from the water-main, through his patent supply-valve; or it can be flushed from a cistern, through a pipe with an inch and a quarter diameter.

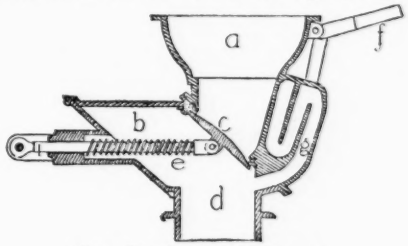


FIG. 62.—POHLEY'S CLOSET.

a, Bowl. *b*, Valve-chamber. *c*, Valve. *d*, Soil-pipe. *e*, Spring. *f*, Lever. *g*, Overflow. *i*, Rod.

Pohley's Closet.—In this country, in 1877, a valve-closet of this type was invented by F. Pohley. The valve is held in its place by a spring that encircles the rod by which the valve is drawn back or held in position. The valve, of metal, fits against a pliable band which is let into the bottom of the bowl. The valve is opened by an L-shaped lever, and the bowl has a simple siphon overflow.

NOTE—The remaining chapters of this interesting history of Water Closets are to be found in a book by Glenn Brown, of which the copyright has been secured by the Industrial Publication Co., of New York. "Domestic Engineering" can furnish this book to those who desire it for one dollar per copy.

Lead—Its Properties and Uses.

By Alex W. Murray.

IT is the duty of plumbers to acquire a knowledge of the chemical and physical properties of metals, especially of those used in their trade, in order that they may be able to judge which metal is best adapted for use in the several appliances in the trade, both as to their durability and freedom from corrosion. The cheapness of books and the great number of authors to select from, upon any special subject, brings knowledge within the reach of all who may seek for it. The lack of systematic reading is a prominent feature in our trade. Is it not a pleasure and a source of profit to know the reason why this or that acts so and so? Or to know why and how you should do this or that? Or to know when, where and by whom anything was made? My readers, God has given you a mind to use, and you will be held to a strict accounting for the use you put it to. You can best serve your Maker and fellow man by being an intelligent worker in the avocation you have chosen.

Lead is a part of the mineral division of the earth, being an elementary body. It is opaque, a better conductor of electricity than of sound, of sound than of caloric; and it is of a bluish-gray color, having a glimmering metallic luster while in the condition of pig, pipe, sheet or shot; but when free from oxidation, as when cut or shaved by

knife or plane, it has a glittering metallic luster, near akin to that of nickel; and when examined under sun, electric or gas-light, it possesses the property of refracting the rays of light producing the seven primary colors upon such bright surface. It is the least elastic and sonorous of all the metals. These properties are exemplified in target practice and the manipulating of the metal in the art of plumbing. Being malleable and laminable, it can therefore be hammered or rolled into thin plates. It is fusible and melts at a temperature of 612 deg., the heat of boiling water, and is therefore naturally the best-adapted metal that plumbers could have adopted for the various uses it serves in their trade. Though it is not very ductile, in

fact being the least ductile, but one (nickel), of all the metals, it can be pressed while in a partially melted condition into any shape—wire, tube or sheet. It is crystallized by hammering and bending. To this property can be charged the cracks or breaks that are often met with in waste-pipes that have been indented, or buckled, or in that portion of hand-made traps where the greatest number of blows have been struck in forming the trap. I reason in this manner: The metal being crystalized by the hammering, it is more readily oxidized (by the assistance of air and moisture), at these points than the rest of the pipe or trap, from the facility by which the air and moisture can get at each atom of lead, on account of such crystalization. When melted and slowly cooled, it forms octahedral crystals. To this property the writer ascribes the cause for the leakage of soldered joints, made in connecting the kitchen-boiler with the heater or water-back of the kitchen-stove. The joints being overheated during ironing or baking, the metal is crystalized, and in time becomes so porous that water easily passes through it. This trouble can be avoided by letting the hot water occasionally flow at the sink.

Although lead, in many instances, has been found in a native state, it is more generally discovered as sulphuret of lead. This is known in commerce by the name of galena. Knight says lead was known in old times. "They sank as lead in the mighty waters" is a part of the triumphant song of Miriam, 1491 B. C. Job refers to its use for writing tablets, "an iron pen and lead." A work of Hesiod's was preserved for many centuries scratched on leaden tablets." Iron, tin and lead were enumerated by Ezekiel as among the commercial objects of the Tyrian trips to Tarshish. The Romans used sheet-lead largely in making water-pipes. Lead was probably the first metal worked, because its ores are abundant in all countries, and it is frequently found at or near the surface of the ground, fusing at so low a temperature as 612 degrees Fah. The discovery of melted lead must have attracted the attention of the ancients at an early day, while building fires in the mineral districts. Ewbank relates that the terraces of Nebuchadnezzar's hanging-gardens were covered with sheets of lead soldered together to retain moisture in the soil. Archimedes used lead pipes to distribute water by engines in the large ship built for Hiero. The plumbers of Pompeii used lead pipes, for we read that the Neapolitan government sold large quantities of "leaden" pipes as old metal. Plumbing is, therefore, no new art, but among the earliest of which we have any record. Rolling or milling lead was invented by Thos. Hale, in 1670.

In 1539, Robert Brocke was the first to cast short lengths of lead pipe, by the use of molds. The lengths were jointed together by a process of burning. A native of St. Germain, in the reign of Henry the IV. of France, invented a process by which the pipe could be made any desired length as follows: The mould was placed in a horizontal position, the metal poured in on top near one end, and, when cast, drawn out; only one or two inches were left in near the spout where the metal entered, so that when another length was cast the hot metal would melt the end thus left, and become a continuous part of the pipe, and so on until the required length was made. The practical making of pipe by the use of piston, cylinder and press, was begun in 1820; but it was talked of as far back as 1705.

The symbol by which lead is known in the mathematics of chemistry is Pb, from plumbum, the Latin name of lead. These letters were used to prevent confusion. The natural inference is that L would be the most appropriate abbreviation, but L is the symbol of Lithium. The proportion by weight (*chemical equivalent*), in which it unites with other elements, is 103.6. Its specific gravity being 11.44x, it is therefore eleven times heavier than water. This makes it available for use in sounding-leads, in ascertaining the depths of seas and oceans. We learn the following from

Steele: From it are made litharge, used in the manufacture of glass, in paints, and as a glase upon earthenware, oxyd-of-lead (Pb O). Red-lead, minium (Pb3 O 4), used in coloring sealing-wax, as a paint, and by plumbers, steam and gas-fitters, as a luting in joining pipes, and white-lead, carbonate of lead (Pb O CO 2).

Lead is corroded by the assistance of acetic acid (vinegar). Care should be taken, in vinegar and pickle factories, to have thicker lead used. We are informed that soft or rain water, when aerated, silt of rivers and vegetable matter (in a state of decay), will oxidize lead; also that pure water, assisted by oxygen, and sewer-gas, are enemies to lead. We know it can be turned into dross by heat. Nitric acid is the proper solvent for lead, producing whitish opaque crystals of nitrate of lead. Comparative freedom from lead poisoning can be attained by workers in lead by cleanliness of person, taking regularly warm baths, seeing to it that the fumes while melting are properly carried off, and changing the working apparel when done with the day's work. In the matter of diet, drink plenty of fresh milk and eat fat mutton, and, as medicine—consult your physician, although an occasional dose of Epsom salts would not hurt you. Steele gives the following test for the presence of lead: Hydrosulphuric acid (H S), which forms with the metal the black sulphuret of lead (Pb S). A very comical illustration is as follows: Thicken a solution of sugar-of-lead (Pb O A) with a little gum-arabic, so that it will not flow too readily from the pen, and draw some comical figure upon paper. This, when dry, will be invisible, but when dampened upon the wrong side and passed over a jet of H S, the picture will blacken into light. The Franklin institute officially declared, in 1870, that there exist no authenticated accounts of the health of the numerous towns and cities supplied by leaden distributing pipes having been injuriously affected. Samples of lead-pipe two hundred years old were submitted to the French academy, which showed so little corrosion that the impression of the sand of the mould in which the pipe was cast was distinctly visible.

"Are lead service pipes safe?" How often this question is asked, and for want of an intelligent reply, how much nervous anxiety caused, as well as needless expense. We answer, yes, especially in the west, where all the water contains so much carbonate of lime. This was demonstrated, a few years since, by the very intelligent head of the water department of Paris, France. He took up lead service pipes that had been in use for hundreds of years, and found no change in the interior or exterior surfaces and no loss in weight. He stated that where lime, even in very small quantities, was present in the water, there was quickly formed a coating on the inside of the pipe that entirely prevented any further action of the lead upon the water, and that there was always present enough of lime dust in the atmosphere of Paris to make it perfectly safe to use even the rain water, conducted through leaden pipes. There can be no question but that good pure lead makes the best service pipes for conveying water to and through our dwellings, from springs and street mains. It it durable, lasting for generations. It is easily and rapidly laid, being pliable and furnished in long coils. It is easily and cheaply repaired, requiring often the removal of only a few inches, expanded by frost, and insertion of a new piece, when a whole length of iron pipe would have to come out, at great cost and inconvenience."

Where used for supplying water, to guard against a possible chance of danger, one should let the water run until he is satisfied that the capacity of pipe has been emptied.

Heavy lead soil-pipe, put up properly, in my opinion, makes the best soil-pipe that can be used. To guard against its being eaten by rats, it can be bound with brass wire gauze.

In conclusion, the writer supposes the reason we plumbers are "leaden heeled" and dull is because we, in time, partake of the nature of the principal metal we work in, "lead." As a piece of advice to my brother "Chips," do not fuse your metal near the nostrils of your customer, lest you make him so dull that he may not see the justice of your bill, and be slow in paying it.

If these few words will have quickened someone's interest in a more complete study of this subject, they are not written in vain.

House Drainage and Plumbing.

By W. H. Genung, Former Chief Inspector and Sanitary Engineer of the Chicago Health Department.

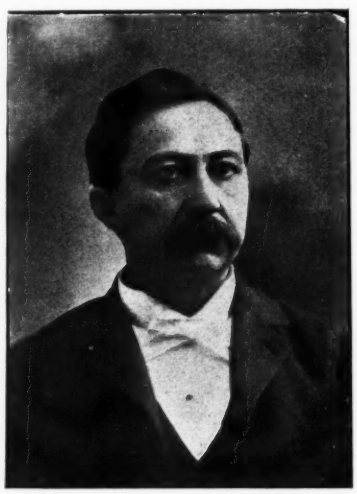
IT has been said that there have been more people killed by plumbers than on the battlefield, and that the plumber and physician have ever been copartners in creating "business" for each other. The reverse of this is the true assertion, and I know the physician and the plumber are both working together for the benefit of the public health. This assertion is so true that I can, in imagination, see the time-honored M. D. with his little pills, walking arm in arm with the artistic M. P. with his pot and ladle, seeking, as the good Samaritan did, where and to whom they may lend a helping hand. There is not a question but that our interests lie together, and that we ought to work together, and in that way become public benefactors to all except, perhaps, the physicians, for I believe that "sanitary engineering" will be so perfected during the next generation that it will be quite impossible for man to die a natural death, much less fall ill, in the coming modern habitation. Of course, this will necessarily compel all physicians to become plumbers, and thus perpetuate their honored calling of saving lives. This would also entirely destroy the necessity for health department officers; but, then, they ought to starve as a just punishment for exposing skin plumbers. In all candor, I did not intend to appear jocular, but this brings to my mind the question, "What will the poor undertaker do?" Just now I cannot think of anything but war for his relief.

It is in the home or habitation that we begin and end our

lives in a natural way, and spend much the greater time during life; therefore, it is the sanitary conditions of our homes that should receive our first thoughts. I remember reading somewhere in ancient history of certain vile "lakes" which were in the midst of certain great cities, which "lakes" contained certain "devils" that seized and destroyed by certain and sudden death any person who ventured too near the shores; and to prevent the destruction of the dwellers in these cities, certain laws were enacted prohibiting and severely punishing any person who might venture beyond a certain prescribed distance in the direction of these lakes. Now, I cannot believe that these vile "lakes" were anything else than lakes of sewage, and the devils were not of the ordinary type of modern Mephistopheles, but great stifling waves of sewer-gas, the stench, from decomposing sewage filth, the exact counterpart of which is found in every one of the tens of thousands of so called catch-basins in our city. And right here, I wish to say, that the city officials who permit such cesspools to be constructed, ought to be imprisoned for life, and the men who construct them should be hanged by the neck until dead. Why? Because each one in such business has destroyed, at least, one life. But we will speak of this further on.

I believe it is admitted that there is but one "best way" to do anything, and if there is anything about a habitation which should be done in the best manner, it certainly is the drainage. "Good enough," in this work, should never mean anything but the best. The ground under and about a house, and the air with which it is filled, should be dry and clean, and, that this may be so, the greatest care and attention must be given, not only to the construction of the drainage system, but also to the details and maintenance. There are many drains, or sewers, of a public character in existence today, and in a good state of preservation, which have withstood the destroying influences of time for thousands of years; and what has been done can be, and ought to be, done again, and much better too.

A private house-drain should be more enduring than the building of which it is a part, because so long as any portion of the building is inhabited there should be perfect drainage. But when we speak of drainage, we do not refer to the usual main sewage-carrying drain, but the whole system of sub-soil, storm-water, and surface drains. Perfect drainage and plumbing, in habitations at least, should be undertaken for the improvement of the public health, and not from a view to pecuniary profit. Houses that are perfect in the general application and construction of the sanitary arrangements are extremely rare, if, indeed, any exist, and those which may have been begun perfect remain so but a very short time, except with the greatest care and attention. I do not believe there is a perfectly-constructed mansion in our great city that would not soon become unfit properly to house swine, except at constant expense and attention which this perfection demands. I have often been asked: "Does it pay to encounter all this additional expense and care?" "Would not the world get on very well without these sanitary improvements?" To the first I answer, "Yes," because thereby we save health, physicians' expenses, pain, sleepless nights and many of the ills which the flesh is heir to. To the last I answer, "The world does not get on well by any means." The record of deaths in our city for a number of years shows that 55 per cent of all children born among us die before attaining the age of five years. Of this percentage, more than half die before arriving at the full age of man and womanhood. Then there are those who come to maturity, but rarely escape the suffering and incidental expense of unnecessary sickness.



Ed. Braden, Jr., San Antonio, Texas.

We do not claim that mere drainage alone has all to do with this great difference in mortality, but it is certainly one of the chief factors. Disraeli once said: "We all eat quite enough, and some of us drink a great deal too much, but this I venture to say, that no man can be too well housed." Therefore, in our so-called tenement quarters, some of which are fairly provided for with drainage, we find many of the inhabitants who are unable to procure proper, nutritious food, or a sufficiency of warm clothing, or live in rookeries, which constantly expose them to all the rigors of the climate, and altogether, exhaust their vitality equally with that required by their daily labors. I think the death rate in tenement quarters of London, before and after the Peabody homes for the poor were built, answers all questions in favor of house sanitation; if not, then in our own city of Pullman, where every sanitary principle is carried out, scientifically and without regard to cost in money, time, or future care. Here we see a city wholly constructed by private capital, which is built as a pecuniary investment, and which provides thousands of homes for the mechanic and laborer at a nominal cost, with conveniences and surroundings in a sanitary way fully equal to those enjoyed by our wealthy citizens, and with a mortality rate lower than in any city in the world of like area and population. And then, apparently intelligent people ask: "Does it pay, and would not the world get on as well without this extra expense and care?" It may be a matter of information to some to know that this Pullman city was built in a directly opposite manner from the usual method, viz: The builders began by constructing a complete system of drainage, and afterward, they erected the buildings.

The object sought to be obtained in the proper drainage of a house and of the ground upon which it is built, are: (1) To remove all causes of dampness not necessary in a healthful atmosphere; and (2) to provide a suitable means for the water carriage of organic wastes to a proper point beyond the building, and in such manner as to exclude from the interior of the house all air which has been in contact with gases generated by these matters after their discharge into the drainage system. To accomplish these results, there should be provided at least two separate systems of drainage; a subsoil and a sewage and storm-water system, which may discharge into one common manhole at some convenient point outside the building, or each may discharge separately into the street sewer, provided ample precautions are taken to prevent the return of the air of the sewer to the subsoil under the house. One or more lines of agricultural or porous tile should be placed under, or near, but always below the foundation walls, to carry away such water as may wash them. This is done to prevent the foundation and building walls from becoming water-soaked, and excessively damp, and to remove excessive moisture from the ground under the building. If this is not done, then no dwelling in our city is safely habitable, as can be plainly shown in so many buildings that are constantly filled with a damp, stuffy atmosphere, easily recognized upon entering them. I have often seen this soil-water dampness so plentiful in old and well-seasoned houses that the carpets, bedding

HUBERT KELLY, Minneapolis, Minn.

and wearing apparel, in rooms not provided with artificial heat, were damp and clammy to the touch and not infrequently covered with mold. I have seen entire families in such houses afflicted with rheumatism or pulmonary illness, often resulting fatally. And yet every day some one will ask: "Does it all pay?" The greatest care should be taken to place these tiles tight together at their ends and thus form a close-fitting joint to prevent the ingress of silt or sand, thereby choking them and destroying their usefulness. It has been suggested to wrap the joints of tile with strips of muslin drawn evenly and tight, as a means of preventing these accumulations.

Another effective way to secure subsoil drainage for foundation and cellar walls is to excavate a small, evenly-graded ditch inside, and near the wall, to be so continued to the point of outlet; after the bottom is cleared of all loose dirt, then fill it to a depth of a foot or less at the highest point with gravel or sand. This trench need not be wider than the narrowest tiling spade, but must reach below the bottom of the foundation, to prevent soil moistening from creeping up the walls. The covering for the trench should be the concrete floor of the cellar, or space under the building; for the entire surface under any building should always be thoroughly covered with several inches of the best concreting. This may not wholly prevent ground air from entering the building above it, but it will lessen its destructive action to an almost imperceptible degree. Do not, in any case, try to combine both the tile and gravel systems in the same trench; it has ever been a failure. At the output of this subsoil drain it should be constructed sufficiently high to prevent sewage setting back into it in case of a gorging of the street sewer at a point near the house; and as an extra precaution against such an accident, I would provide a suitable tide-valve at the lowest point of the drain. A water seal, or running trap, should be placed in this drain on the house side of and as near the tide-valve as possible, if the manhole connection is adopted—and this method is best suited to our city. As a rule, the tile will be found to be much cheaper than the gravel and trench, even with using two lines of tile, which need not be much larger than one inch internal diameter. It is better that the drain be placed as far as possible below the level of the foot of the foundation. The more rapid the descent the better, but if it be laid exactly level, or even a little depressed in places, provided it have an unobstructed outlet and thoroughly protected joints, all surplus will be discharged as soon as the general level of soil water attains the level of the overflow point. It is not unusual to connect the subsoil drain with the main house drain, and also the water pipes from the roof. This method will surely contaminate the air of the subsoil; therefore it is important that all soil water be discharged into a manhole, or the street sewer, by an independent line. In no instance should even the rain-water pipes, or indeed any other pipe or drain, directly connect with the subsoil drains. What thus far has been said of subsoil drainage applies more generally to clay ground, such as is usually found within a radius of one mile or more from the exposition building. However, there is another important difficulty which arises from the aerial exhalation of a loose or gravel soil. Any character of soil contains a large amount of air, and, under varying circumstances, such as changing barometric pressure, the rise and fall of water in the soil and the action of winds, this air enters the cellar and the house. The draughts caused by the heated atmosphere in the house causes this vitiated ground air to enter every portion of the building, filling every room with impurities too vile and injurious to be described. The more porous the soil, the greater the difficulty to keep out this poisonous air. As an example I will mention a locality in our city with which you all are familiar, and which is covered, on a greater part, with a number of dwellings.

This locality is chiefly "made ground" and rests on what used to be a graveyard. As said before, loose soil contains

a large amount of air, the exact amount of which could be determined by filling the interstices with water and measuring its quantity. Every wind that blows, every rise of water into this mass, changes a portion at least of this air. If in this loose soil there lies a mass of carrion, its stench must be still perceptible to a fresh nostril, because this interchange to the extent of free inhalation and exhalation is always going on.

This is particularly true when the house is especially constructed to prevent the entrance of exterior air, and depends for its ventilation (?), that is, its intake of air, from this vitiated ground under it. This putrefying carrion below, with the human habitation above it, is not an overstated fact of what exists in many densely populated localities of our country. Much, if not all of this intake of foul air into the dwelling may be avoided by covering the surface of the ground under the house with several inches

W. D. ALLEN, Fargo, N. Dakota.

of the best concrete, or with clay well tamped; then cover with a heavy coating of asphaltum, applied hot, and on this another layer of concrete.

Besides covering the ground under the house, apply asphaltum in the same manner to the outside of the wall, from the foundation to a little above the level of the outside soil.

The illustration just given relating to the pollution of the loose soil and its contained air is not exaggerated in the least, when we consider the magnitude of the constantly renewed underground filth, an evil largely due to the careless habit of thousands of inhabitants who dispose of all kinds of household waste upon and into the ground adjacent to their dwellings. For the present, the most effective protection against the evil results of this ground pollution is to isolate, so far as practicable, the house from the ground on which it is founded, and patiently wait for the time, so sure to come, when, by sewerage and the compulsory use of the sewers, there shall be a complete purification of the subsoil. And when this much desired time shall have come, I candidly believe that the days of intermittent fevers, neuralgia and general low tone of the human system will have vanished forever. It should thus be looked upon as a positive disgrace for an intelligent adult to fall sick with a zymotic disease.

The most important step toward perfect house drainage is to provide suitable means for removing by water carriage all house waste from the kitchen, laundry, baths, bowls, water-closets, etc. This is usually and very properly accomplished by constructing a main drain, or sewer, with the necessary branches under the building, and connecting it with the street sewer at the nearest point to the house. However, the means and material generally adopted are of the poorest possible description, and, unfortunately, are sanctioned, or rather, cannot be prevented, by law. We should provide a main house drain and branches of metal or other non-destructible material, and place it in full view throughout its entire length and branches. It should rest on piers of masonry, on strong iron brackets, or be securely suspended to the permanent parts of the building. This drain should have a heavy descent to a convenient point outside the building, in order to produce the maximum scouring effects; also to remove as rapidly as possible all sewage solids to a safe distance beyond the building, and to prevent, so far as possible, the liabilty of the freezing of the sewage. This drain should be so well constructed that no gases or water can escape, even under strong pressure, and should be of sufficient strength to withstand successfully a water-testing pressure of at least one story of the vertical pipes which connect with it. To do this, all joints should be double leaded and well swedged all around in the most careful manner.

A suitable fresh air inlet pipe should be provided for this main drain, near but on the house side of the manhole or running trap. It has been asserted by very reputable sanitarians that this inlet pipe should be extended to a point at least level with, if not above, the roof. This may not be harmful at all times, but I have seen them entirely choked with vapor, caused by a strong down-flow of vapory atmosphere, when placed on the outer and shaded side of the building. The effect is a partial vacuum, or a strong suction on the water-seal in the running drain trap, which, added to the pressure from the street sewer on the opposite side, in all probability delivers the vilest of sewer air into the house drains. It certainly causes a fluctuation, if not a total stagnation, in the drain air, when the interior and exterior temperatures are nearly equal. This cannot occur when the inlet is placed near the ground, because the difference in altitude alone will produce an air current with a velocity of several hundred feet per hour, quite sufficient to dilute the drain air to a nearly harmless condition.

It is the usual method to connect the rain-water pipes with the main drains, and this is not to be discouraged where no automatic flushing apparatus is provided; but all rain-water pipes which do not extend to the highest roof gutter should be provided with a proper sewer pipe trap in the ground to prevent sewer air from being discharged at their upper end in close proximity to windows of sleeping apartments.

To illustrate why all drain and waste pipes should be constructed gas tight, I will state that it is mostly in sewage filth that disease germs are found, and that the size

of these germs can be best understood by comparison with their usual attacking point, viz., the blood. Now a blood corpuscle is about 1-3200 of an inch in diameter, and the disease germs but 1-50 the size of this. These disease germs are constantly floating in house sewage and the gases generated therefrom. Did I use too strong language in stating that these so-called catch-basins should be prohibited by law, and that the constructors should be hanged? I would greatly prefer that the house waste should be deposited into the street gutter, there to be evaporated by the atmosphere and the sun's rays, or carried away by storm water or the city's scavenger, or both.

Plumbing.—Next in consideration is the system of pipes (waste and soil pipes) which connect with the house drain and branches, and which carry the sewage waste from the plumbing fixtures throughout the house. These pipes should be carried up through the roof or heated flue, of undiminished size, and generally unprovided with bend, cap or cowl at the top; they should never run horizontally, except for very short distances, and never have a trap placed in their entire length, to the end that a free circulation of air may be at all times maintained throughout them. They should be of the minimum size necessary in their vertical, and four times this capacity in their horizontal lengths, in order that the fullest scouring qaulities may be obtained, and reduce the filthy lining deposit on the inner surface to the smallest possible limit. No flushing will prevent this, but good ventilation will make it harmless. These pipes should be made absolutely air tight, and if of cast iron should be extra heavy, double leaded and swedged all around and thoroughly secured to place.

Wherever it can possibly be avoided these and the water supply pipes should be placed in full view at all times, and never be concealed by pernicious carpentry or other more troublesome methods. To cover up plumbing is to mystify the work, which should always be plainly seen and understood; it also offers an opportunity for poor workmanship, and even poorer material, and tends to lead the plumber into untidy if not careless habits with his work, because he feels that "there is not much need of taking any pains, as it is covered up and will never be seen, anyway." You all know that a joint in a vertical pipe which is placed in a groove, or even close against the wall, cannot be as thoroughly swedged as if it were placed a few inches from it. If it becomes absolutely necessary to conceal any of these pipes, then see to it that the joints are left in view or easily accessible. Place man-holes at bends or other convenient points; never make a T or right angle connection, and always connect lead pipes or traps with a brass ferrule. All plumbing fixtures should be connected with these vertical waste pipes by branches, which branches should always be properly trapped and auxiliary vented in such manner as to prevent siphonage, from action of the atmosphere, or sewage waste. The number of such plumbing fixtures should be reduced to the lowest convenient limit, in order that the possibilities for unsanitary conditions may be also limited. Under no circumstances should there be a wash-bowl or other fixture which connects with the drain in a bedroom or room connecting with it. All plumbing fixtures on bedroom floors should be placed in bathrooms, and all bathrooms should be provided with external light and ventilation.

All plumbing fixtures should be placed as nearly as possible one over another on the several floors, in order that they may connect by short waste pipes with one larger vertical pipe, but if this cannot be conveniently done, then pipes should be separately provided for each set of fixtures. Wherever any plumbing pipes pass through floors from one story to another, I should thoroughly seal the channel with mortar or asphaltum, to exclude vermin and vitiated air from below. Kitchen sinks should not be provided with grease traps, for they are a species of cesspool; the bathtubs should be provided with overflows which are accessible at all times; the wash-bowl and other modern fixtures should be as free as possible from fouling places, and water-closets always provided with adequate flushing tanks. I realize that these suggestions will materially lessen the number of fixtures to be provided and perhaps lessen the amount of plumbing work to be placed in the modern house, but I have attempted to give my opinion only, and am perfectly willing to bear the criticisms of sanitarians. I will not attempt to suggest any particular make of water-closet as being the best, but I will say that any fixture which will befoul itself is wholly unfit to be placed in any building, much less a habitation. I shall not attempt to mention all the poorer ones, but I cannot help repeating the words of an eminent sanitarian when, speaking of the old-style "pan" closet, he said: "It may have been invented by the devil, as it is certainly as vile as he."

It is no longer a question of "sewer gas," but how to lessen its generation and obviate its destructive action through defective plumbing and drainage. I believe the best and most rapid results can be accomplished by united action on the part of the plumbers' associations. I also believe that the board of health can materially assist in these good results by formulating uniform regulations for sanitary work, and compelling all to come to that standard.

Water Supply of Cities.

By C. B. Davis, C. E.

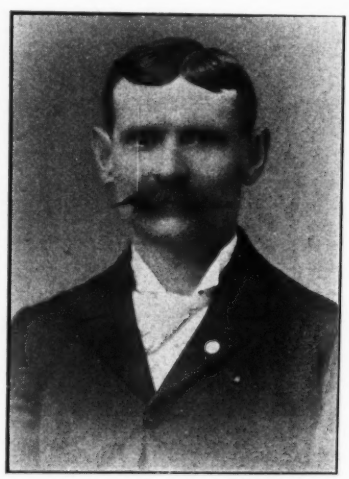
TO a city not having a general supply, but dependent entirely upon the open well and cistern for its water, but contemplating building works for a general supply, much may be said in the way of general and special advice, and it has occurred to me that of the many ways of treating this subject, the one which would best convey the idea would be to follow out a line of reasoning such as a city desiring a public water supply would naturally adopt. The field is so great that I can at best but merely touch upon the subject generally without attempting to go into details.

The first question which would naturally suggest itself is, "What is the condition of our present water-supply?" The condition in general is that all sub-surface supplies from the vicinity of habitation, unless from a considerable depth, range in quality all the way from reasonably pure water through the different insensible gradations of pollution up to that which is positively dangerous for a human being to use. The exact condition of the water requires careful analyses to determine, but the summation of the evidence of the past leads conclusively to the belief that there is too much danger to admit of using water taken from the upper strata underlying a city of any considerable size, even though the water analyzes well. And the reasons are plain. The excreta and other wastes are usually disposed of or stored in a manner calculated to produce the very worst results. They are kept in a pit or cesspool, seldom, if ever, tight enough to prevent the fluid penetrating the soil, and the mass is so kept from the sun and air as to render oxidation and purification impossible. If spread broadcast upon the surface, the air, light and vegetation would soon reduce and destroy it; but in the vault and cesspool it serves only to pollute, to the limit, all the liquids it receives, which, when loaded with their death-bearing poisons, creep out into the soil, rising, falling, spreading with the fluctuations of the ground water, polluting all the water within its reach, soon overcoming entirely all the recuperative and destroying power of the soil, and giving off noxious gases to be drawn up through cellar floors, to pollute the air of dwellings. The age of the city, the character of its subsoil, the slope of the strata, the compactness with which it is built up, all have their influence.

That a very general pollution of the whole sub-soil water can exist is shown by the results obtained at Madison, Wis., in 1882, the year previous to the construction of the city water supply. Analyses of hundreds of wells in different parts of the city proved them to be unfit for use, except in the outlying and sparsely settled portions. The city is built upon a drift deposit, and the results were about the same, regardless of the character of the earth in which the well was dug. The worst wells were in the low ground, apparently receiving much of the filth from the higher levels.

At Rockford, Ill., the well from which the water for public supply was obtained was sunk near the river bank, abreast of the city, upon the supposition that filtered river water would be obtained. The result was as might have been predicted; the well took but little from the river, but under-drained a considerable portion of the thickly built-up part of the city, located upon strata which sloped toward the well, and the water, as analyses showed, was too filthy for any living creature to use.

There are but few physicians who have not in their practice been repeatedly brought to deal with disease traceable directly to the use of polluted water from shallow wells. That impure water is a means of conveying disease needs no proof from me, and that the water in most wells is either decidedly impure or of questionable purity, I think is beyond a doubt.



WM. KOCH, Washington, D. C.

Having thus obtained pretty positive evidence of the probable impurity of the water used, we are naturally led to the inquiry, "How can it be bettered, and, aside from obtaining purer water, what advantages result from a public water supply?"

A proper public water supply should come from a source of the greatest present purity and softness, one as free as possible from all danger of future contamination, and ample in quantity for all demands, not only in the near future, but such a source as will yield increasing quantities to keep pace with increasing demands. The water supply can be bettered, therefore, by taking all that is used from the common source, distant from the city or deep below it, which is pure and so situated that the wastes of a city cannot contaminate it. No matter how well they may analyze, we can never prevent having the suspicion that there lurks in the water taken from near dwellings some means of conveying disease which cannot be detected by the chemist, the microscopist or the biologist.

It is one of the peculiarities of the poison taken into the system in drinking water that it does not always manifest

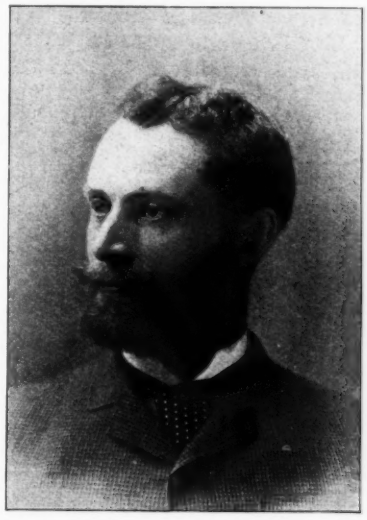
itself at once. In some cases it does, but the rule is that the portion which is in excess of the amount which the system can destroy becomes, as it were, latent and cumulative, holding itself ready to assist to the full extent of its power the rapid development of the germs of any specific disease, and making the person a more ready victim.

Households continue for years to use water from foul wells, and because not enough is held in the system to cause positive disease or death, their well is believed to be a good one. This fact, and the desire to save the money a change would cost, as well as a wish to believe their well pure, are very potent in making people believe in wells as a source of supply, when, in truth, few more dangerous natural sources of water supply can be found.

The open well or cistern being done away with for culinary purposes, and with them their capacities as receptacles for all such refuse as accident or designing juveniles may consign to them, and all the water used being brought in closed mains under pressure, will make a great gain in the matter of purity, and there is no matter in connection with a city's water supply of greater importance than purity. The advantages may be considered in their order of importance as those of a sanitary nature, those affecting finance and business, and those of public and personal benefit. Some of the sanitary advantages of pure water are seen in a better general health of the city, a decrease in the death rate, the possibility of greater cleanliness of the city, the provision of means for making a self-cleansing sewerage system possible, thus doing away with the vault and cesspool with their filthy contents spreading their poisonous fluids and vapors in every direction, both above and below ground, and the benefit and convenience of having an abundance of water at any place desired. As affecting finance, we have but to note the greater protection against destructive fires which might easily, in a few hours, consume property much more valuable than the cost of the entire works. Then, too, considerable reductions in insurance rates usually follow the successful inauguration of a proper system of water supply.

Public policy demands that the city have a positive and constant growth; that every reasonable attraction be offered manufacturers and individuals to cause them to locate with you; that each citizen do all in his power to protect and advance the interests and welfare of all his fellow-citizens, each mutually dependent largely upon the others, and all alike affected. And what can promote the public policy better than an abundance of water for protecting the property of the individual and of pure water for domestic purposes?

It being, therefore, a matter which affects all the interests governing private and public opinion, and, as I think we have proved, a necessity, the next question that arises is: "Where shall we obtain the water for city supply?" The sources possible to draw from may be grouped into surface and subterranean waters. The former are lakes, ponds and streams, and water caught in artificial storage basins. The subterranean water lies hidden in shallow and deep gravel deposits, in the deep-lying porous strata, and issues from the earth in the form of springs. Of course it is not to be expected that all of these possible sources would be usually found available at any place; generally one is confined to a limited number and compelled to take the best to be had. The choice is often a matter requiring the most careful study and the exercise of the highest judgment and trained skill. It is, of all the matters to be decided in connection with a proposed water supply, the one of vital importance; and all else must be made secondary to it, and no decision in a case involving any doubt should be made until the chemist, the physician and the engineer have been called to study it.



WM. BELLAMY, South Omaha, Neb.

Inasmuch as water is never found naturally perfectly pure, and as the rain seldom reaches the earth without having absorbed some objectionable matter, and as water constantly tends to absorb impurities while on the surface, it follows that surface waters are liable to become very seriously polluted. Water percolating slowly through porous soil containing no deleterious material, undergoes, or is subjected to, purifying influences, and we find where the character of the strata is such as to to exert no objectionable influence upon it, that waters taken from a considerable depth below the surface rank among the purest and most nearly free from organic contamination. Hence, in selecting our supply we should look always with greater suspicion upon a surface source than upon one coming from the earth. A river is the open drain, often of a very large extent of cultivated and thickly built up country, besides being a very convenient place of deposit for offal, carcasses of dead animals, etc.; they are the natural receptacles of the wash from farm lands, the wastes from manufactories, the sewage and drainage of towns, and all manner of waste and deleterious materials. It is true that it is often so great in volume as to dilute the impurities to such an extent as to render them harmless or comparatively so; and also, that some oxidizing and destroying effect comes from the flow of the river and the contact with the air and water. This latter, however, is not so great as popular opinion would indicate, and there is a division of opinion concerning this purification among the best authorities, some holding that it is safe and right to expect sufficient or entire purification to result after a

flow of ten miles. Still, the fact that rivers always tend to become more impure is a strong reason for deciding never to use the water of a river for a city supply unless a better source cannot be had. If compelled to use river water, a careful examination of the whole stream and its tributaries above the city should be made.

Ponds and lakes are less likely to be polluted than streams. Deep ones in a hilly and precipitous country, having living streams for feed and outlets, are best, and are invariably safe sources of supply, while shallow lakes, whose waters are changed and circulated slowly, from the rapid growth and development of algae often contain large amounts of decaying vegetation. Storage reservoirs, supplied by the drainage from uncultivated land, and fed by living streams, probably give as good water as can be had from a surface source. In general, surface waters tend rather to an excess of organic pollution, while those from the earth have an excess of mineral matter, giving them often an undesirable degree of hardness. Those coming from a deep sand rock foundation are the best, containing often not a trace of organic matter, and the minimum amount of both temporary and permanent hardness, while those from a lime rock strata are objectionable generally, except in the absence of a better supply. Next in order of purity and softness are those from springs and deep gravel deposits, or those not in close proximity to or underlying a city or other possible source of pollution. The water from shallow gravel beds is generally but little better than surface water.

The quantity of water to be obtained from any gravel deposit depends entirely upon its extent, and may be said to have two capacities—the temporary one, or the storage capacity of the deposit above the level from which the water is drained, and the permanent one due to its superficial extent. The water in the deposit comes entirely from the percolation to it from the rainfall, or from streams and ponds; the latter, however, are generally outlets for the deposits instead of feeders. Often a gravel deposit is separated apparently completely into two or more parts by nearly horizontal strata of clay, hardpan or other material nearly impervious to water, and as soon as this fact is ascertained, and without investigating farther, it is assumed that the separating stratum is continuous and always of sufficient thickness to insure the entire and perfect exclusion of all surface water. The facts seldom if ever warrant this belief. The manner in which surface deposits were formed would suggest to the careful and well-informed investigator that the chances are no better than even if the layer is continuous. The probability is that could you examine every square foot of it, you would find it varying greatly in thickness and character, and often running out entirely, perhaps in the place least desired. Hence, the fact of the existence of a "second water," as it is often called, apparently separated from the surface water by an impervious stratum, amounts to but little, particularly if it extends beneath your city, until by careful examination you have found it to be continuous and of sufficient thickness to effect the desired result.

To be of any value the deposit must connect with the surface, and for a great extent of territory, for it is from the surface that it obtains its water supply. The passage of a city's drainage at slow velocity through gravel would undoubtedly for a short time render it practically sufficiently pure, but the constant flow of filthy fluids through gravel will soon kill its oxidizing and purifying power, and it is simply a question of time for it to pollute a very large deposit, even though the draught from it be at a considerable distance, provided it be lower than the city.

The existence of a water-bearing sand rock beneath your city certainly suggests a very desirable possible source of supply, and should be studied carefully with a view of using its water if no insurmountable engineering difficulties oppose. The uncertainties attending the extent of a gravel deposit render it somewhat hazardous to decide upon it as a source of supply. The means of collecting the water should be such as to admit readily of extension and enlargement, and the pumping machinery should be so located, if possible, that, in the event of a failure to obtain a sufficient amount, another source may be drawn upon, either regularly or in an emergency.

It is probable that nearly every failure to obtain from a gravel bed a sufficient supply to keep pace with the increasing demand has been due to ignorance at the start concerning the extent of the deposit; failure to provide a reserve to draw upon in emergencies, and improperly planned works for collecting the water.

SCHNEIDER'S INSTANTANEOUS

Bath Water Heater

Highest efficiency and cheapest prices.

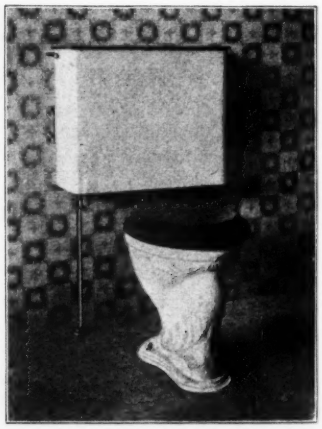
"Ann Arbor" Hygienic Steel Tank

Low down combination, lined with copper or lead. Enameled in any color.

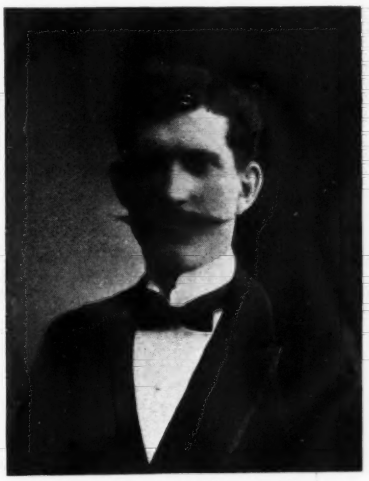
Write for prices.

Schneider Closet and Heater Co.

ANN ARBOR, MICH.



The belief popular among those of limited experience that almost any one can plan and build a city water works, and the failure fully to appreciate the great responsibility involved, and, besides, the desires of unscrupulous parties, are the prime causes of these failures.



J. O. Sawkins, Chicago, Ill.

Having decided upon the source of supply, the next question is, "What shall be the character of the work, the system, as it is called?" Taking the matter in the abstract, for the purpose of comparison, if we sum up the merits and the disadvantages of all the methods of water supply, it will be found that the best engineers arrange them in the following order of merit: (1) A natural gravity supply. (2) Pumping by hydraulic power, under favorable conditions, to an elevated storage reservoir and then distributing by gravity. (3) Pumping by steam power to an elevated storage reservoir and distributing by gravity. Under certain conditions steam may be better suited to the work than water power. (4) Pumping into a large elevated tank-standpipe or water-tower, when there is not sufficient elevation in the immediate vicinity for a reservoir site. (5) Pumping with direct pressure into closed mains.

The water supply and sewerage of a city are, when properly considered, the most important matters that a city ever has to undertake, and while economy should be observed in all public money, true economy in these matters means the spending of enough money to obtain the best that can be had. We all know how potent an element the mere amount of dollars and cents is in fixing upon the character and extent of all public works, and that, in the west at least, the smallest amount possible is appropriated for water works construction. The purity of the water and the durability and proper construction of the works are and should be the deciding conditions—not how much money you would like to spend; and the matter of expenditure should be adjusted to the work, and the work not adjusted to the money, for it is practically no better for a city to build works improperly, or with water supply of questionable purity, than it is to go along without water works and depend upon other means for fire protection. The rest of the work, that of arranging the details of the system, is so largely of a technical nature, and depending so much upon professional knowledge, that it should be left to the experienced engineer.

If plumbers generally knew all there is to be known about the "Tower-of-Strength" Blatchford Metal Products there'd be mighty few plumbers who wouldn't use these brands.

Blatchford Solder, Lead Pipe, Sheet Lead, Lead Traps, Bends, Ferrules, etc. Write for prices.

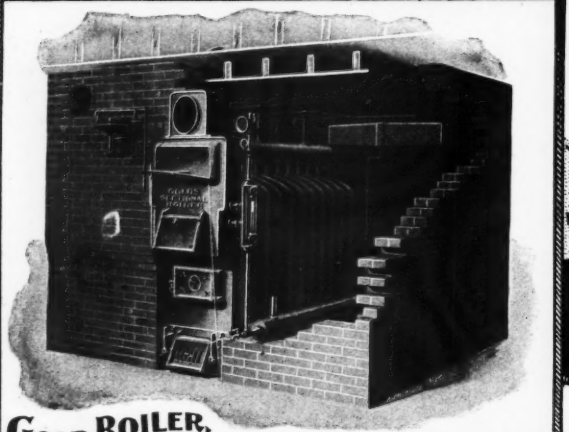
E. W. BLATCHFORD & CO.

54-70 North Clinton Street, Chicago.

E. W. BLATCHFORD & CO. CHICAGO. REPUTATION. ESTB. 1854 INCO. 1890 A TOWER OF STRENGTH

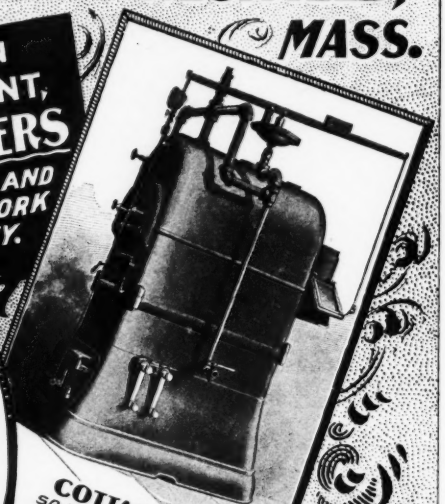
THE H.B. SMITH CO.

WESTFIELD, MASS.



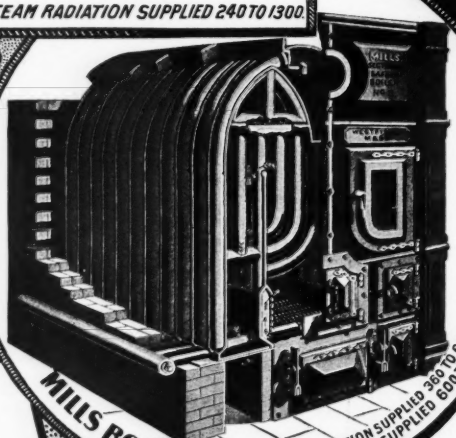
GOLD BOILER,
SQ. FEET STEAM RADIATION SUPPLIED 240 TO 1300.

EUROPEAN AGENT,
AUG. EGGERS
BREMEN AND NEW YORK CITY.

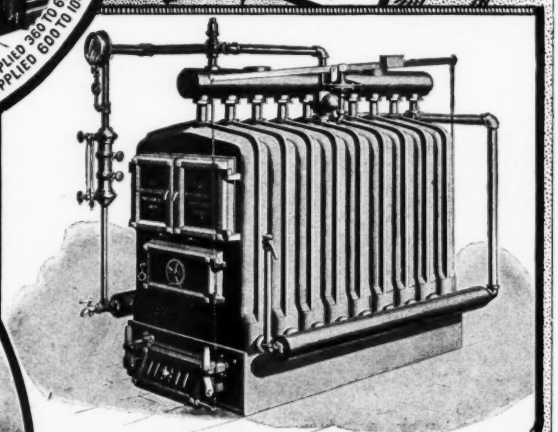


COTTAGE BOILER,
SQ. FEET STEAM RADIATION SUPPLIED 100 TO 550.

PACIFIC COAST AGENTS,
DUGAN BRO'S.
SAN FRANCISCO CAL.

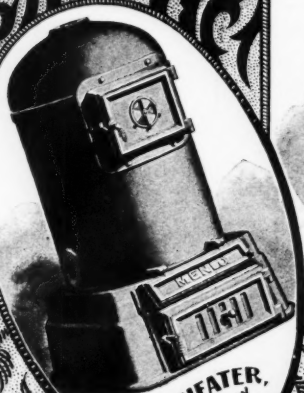


MILLS BOILER, SQ. FEET STEAM RADIATION SUPPLIED 360 TO 6250.
SQ. FEET WATER RADIATION SUPPLIED 600 TO 10400.

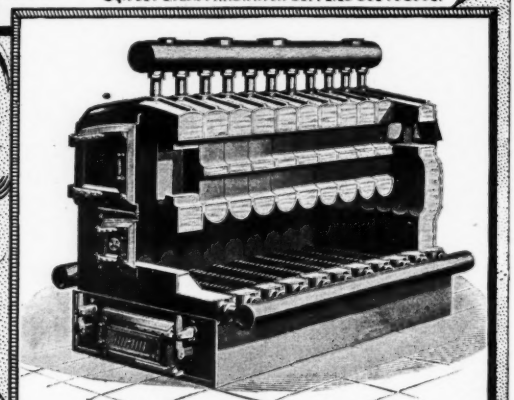


MERCER BOILER,
SQ. FEET STEAM RADIATION SUPPLIED 300 TO 3500.

COTTAGE BOILER,
SQ. FEET WATER RADIATION SUPPLIED 150 TO 1000.



MENLO HEATER,
TANK CAPACITY
100 TO 180 GALLONS.



MERCER BOILER,
SQ. FEET WATER RADIATION SUPPLIED 500 TO 5800.

Western Agents

WESTERN BRASS MFG CO.

ST. LOUIS, MO.

SALESROOMS:
133 CENTRE ST., NEW YORK CITY.
510 ARCH ST., PHILADELPHIA, PA.

Heating and Ventilation.

A Course of Lectures which, when completed, will cover the theory and practice of those arts.

By Chas. L. Hubbard, of Boston, Mass.

All rights reserved for reproduction.

Direct Hot Water.

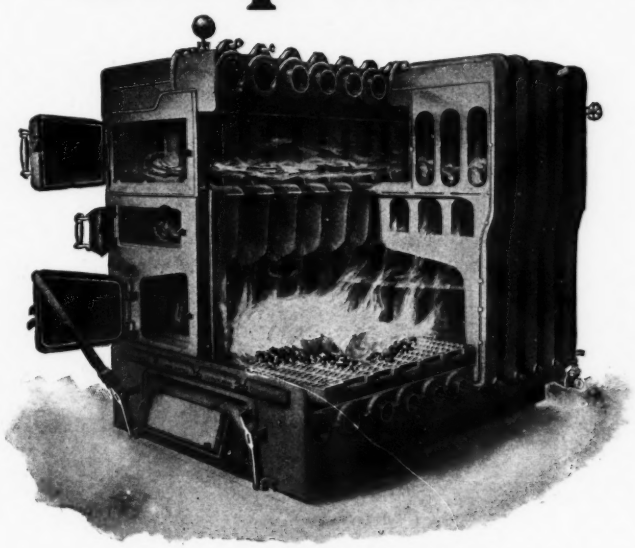
THIS system is similar in construction to one for direct steam, except that hot water flows through the pipes and radiators instead of steam. It is largely used for the warming of dwelling houses to which it is especially adapted owing to the ease with which the temperature of the water can be regulated.

Where steam is used the radiators are always at practically the same temperature, and regulation must be secured by shutting off steam and turning it on at intervals depending on the outside temperature; while with hot water, the radiators can be kept turned on all the time, and regulation secured by varying the temperature of the water flowing through them.

There are two distinct systems of circulation employed; one depending on the difference in temperature of the water in the supply and return pipes, called "gravity circulation;" and another where a pump is used to force the water through the mains, called "forced circulation." The former is used for dwellings and other buildings of ordinary size, and the latter for large buildings, and especially where there are long horizontal runs of piping.

For gravity circulation some form of sectional cast-iron boiler is commonly used, although wrought-iron tubular

"Capitol Heaters"



'98 Series Capitol Steam Boiler.

The '98 Series Capitol Boiler shown in the adjoining illustration is constructed according to the latest and most approved ideas on the subject of boiler building.

Descriptive catalogues will be furnished on application.

United States Heater Company

NEW YORK 129 WORTH ST. | DETROIT 251 CAMPBELL AVE. | CHICAGO 52 DEARBORN ST. | PHILADELPHIA 619 ARCH ST.

New England Sales Agents: Dean Boiler Co., 75 Pearl St., Boston, Mass.

boilers may be employed if desired. In the case of forced circulation a heater designed to warm the water by means of live or exhaust steam is often used. A centrifugal or rotary pump of the type shown in Fig. 12 is best adapted to this purpose; this pump may be driven by an electric motor or a steam engine, as most convenient. Fig 13 shows the general form of a hot-water radiator, which is similar to one used for steam, except the sections are con-

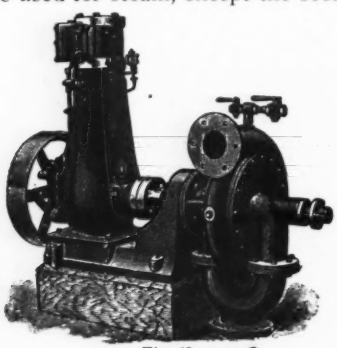


Fig. 12.

nected at the top as well as at the bottom; this is shown by the cap over the opening at the top of the end section, which does not appear on the steam radiator shown in Fig. 2. A system for hot-water heating costs more to install than one for steam, as the radiators have to be larger and the piping of larger size and more carefully graded.

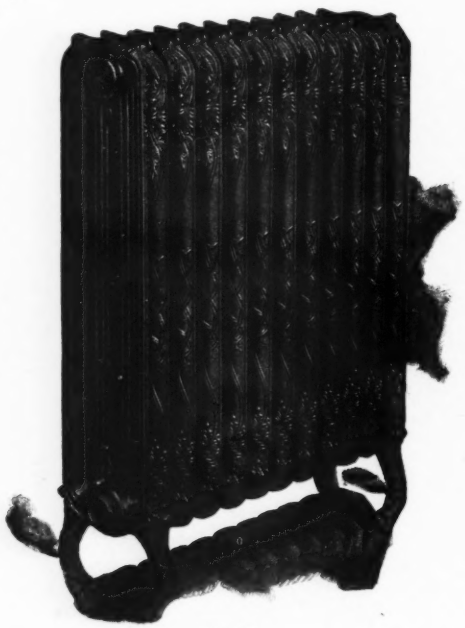


Fig. 13.

Indirect Hot Water.

This is used under the same conditions as indirect steam, and the heaters used are similar to those already described. Special attention is given to the form of the sections in order that there may be an even distribution of water through all parts of them. Figs. 14 and 15 show typical hot-water radiators for indirect work. As the stacks are placed in the basement of a building, and only a short distance above the boiler, extra large pipes must be used to secure a proper circulation, for the "head" producing flow is small. The stack castings, cold and warm-air pipes and registers are the same as in steam heating.

Exhaust Steam.

Exhaust steam is used for heating in connection with power plants, as in factories and shops or in office buildings which have their own lighting plants. There are two methods of using exhaust steam for heating purposes. One is to carry a back pressure on the engines of from 5 to 10 pounds, depending on the length and size of the pipe mains, and the other is to use some form of "vacuum system" which consists of a pump or ejector

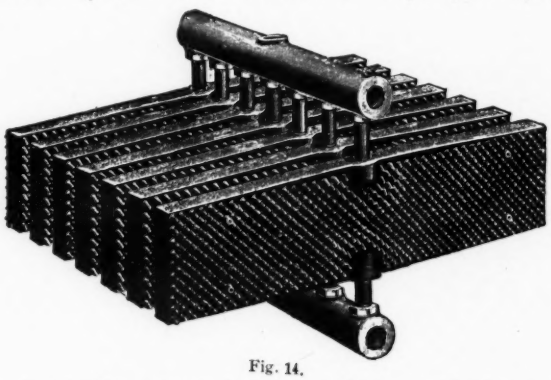


Fig. 14.

attached to the returns from the radiators; this draws the steam through the radiators and tends to reduce the back pressure on the engines rather than to increase it.

Where the first method is used, and a back pressure carried, either the boiler pressure or the cut-off of the engines must be increased to keep the "mean effective pressure" the same and not reduce the horse-power delivered. In general it is more economical to utilize the exhaust steam for heating. There are instances, however, where the relation between the quantities of steam

Fig. 15

required for heating and for power are such, especially if the engines are run condensing, that it is better to throw the exhaust away and heat with live steam. Where the vacuum method is used these difficulties are avoided, and for this reason it is coming into more common use. If the condensation from the exhaust steam is returned to the boilers the oil must first be removed; this is usually accomplished by passing the steam through some form of grease extractor as it leaves the engine. The water of condensation is then passed through a separating tank before it is delivered to the return pumps. It is better to remove a portion of the oil before the steam enters the pipes and radiators, else a coating will be formed on their

inner surfaces which will reduce the heating efficiency of the radiators.

Forced Blast.

This method of heating, in different forms, is used for the warming of factories, schools, churches, theaters, halls or any large building where good ventilation is desired. The air for warming is drawn or forced through a heater of special design, and discharged by a fan or blower into ducts which lead to registers placed in the rooms to be warmed. The heater is usually made up in sections so that steam may be admitted or shut off from any section independently of the others, and the temperature of the air regulated in this manner. Sometimes a by-pass damper is attached, so that part of the air will pass through the heater and part around or over it; in this way the proportions of cold and heated air may be so adjusted as to give the required temperature to the air entering the

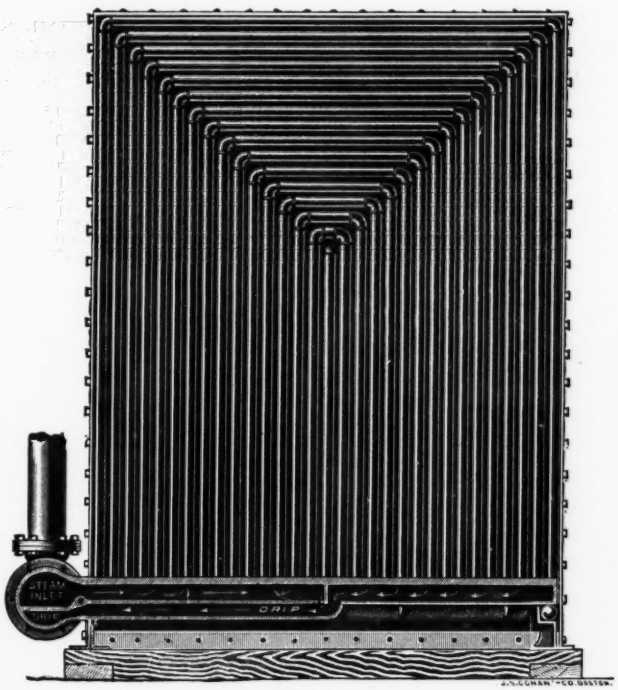


Fig. 16.

rooms. These forms of regulation are common where a blower is used for warming a single room as in the case of a church or hall; but where several rooms are warmed, as in a schoolhouse, it is customary to use the main or primary heater at the blower for warming the air to a given temperature (somewhere below that which is actually required), and to supplement this by placing secondary coils or heaters at the bases of the flues leading to the different rooms. By means of this arrangement the temperature of each room can be regulated independently of the others. The so-called double duct system is sometimes employed. In this case ducts are carried to each register, one carrying hot air and the other cold or tempered air, and a damper for mixing these in the right proportions is placed at the base of the flue. Fig. 16 shows a common form of the heater used in connection with a blower or fan; this is encased in heavy sheet iron or brickwork, and is so connected with the fan that the air is drawn or forced through the spaces between the hot pipes and thus heated. Fig. 17 represents the usual form of fan wheel used for heating and ventilating work; this is enclosed in a steel plate casting with inlet openings at the sides and a discharge outlet at the outer edge of the fan. A common arrangement of fan and heater is

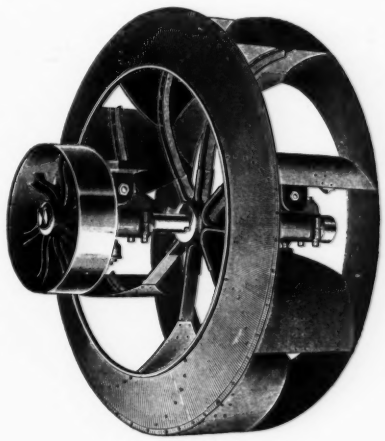


Fig. 17.

shown in Fig. 18. The arrows indicate the cold air entering the heater and the discharge from the fan is through the circular opening at the top of the casing. This fan is shown as being driven by a direct connected engine. Electric motors and steam engines are both used for this purpose and may be either belted or direct connected.

Fig. 19 shows a fan and heater arranged for a double duct system. A portion of the air passes through the

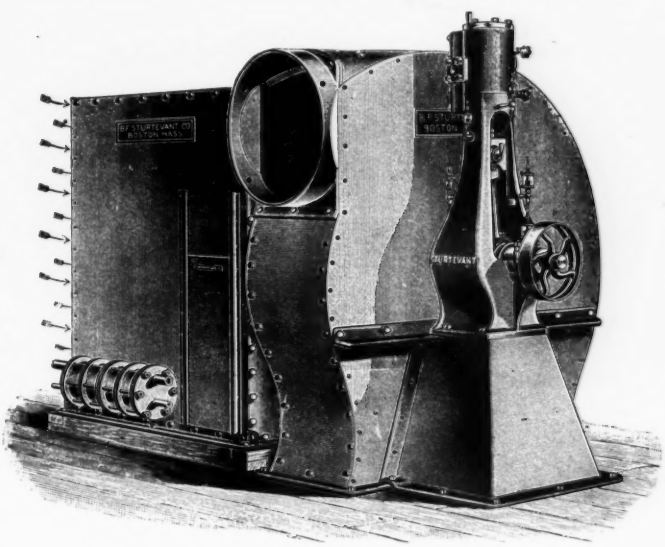


Fig. 18.

heater, the top of which can be seen where the casing is broken away; the remainder of the air passes partly through, and partly over the heater, depending upon the position of the by-pass damper above. The temperature of the air in the upper duct is, therefore, less than that in the lower, and the two can be mixed at the registers as required. In Fig. 20 is shown a type of fan called the

FORBES' PATENT DIE STOCK

FOR HAND OR POWER

Occupy less floor space. require less power to run, more simple of construction, far cheaper than any other machine of same size.

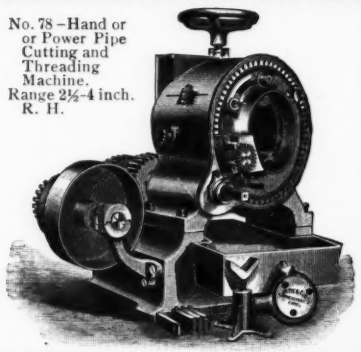
Ratchet Drills, Ratchet Die Stocks, Malleable Iron Pipe Vises

Send for illustrated catalogue

MANUFACTURED BY

THE CURTIS & CURTIS CO.

18 GARDEN ST., BRIDGEPORT, CONN.



No. 78—Hand or or Power Pipe Cutting and Threading Machine. Range 2½-4 inch. R. H.

"cone fan." This is usually placed in an opening in a brick wall and discharges air from its entire perimeter into a room called a "plenum" chamber, with which the various distributing ducts connect.

Electricity.

Unless electricity is produced at a very low cost its use for heating residences or large buildings is not practicable. It has, however, quite a field of usefulness in the heating of small offices, bath rooms, cold corners of

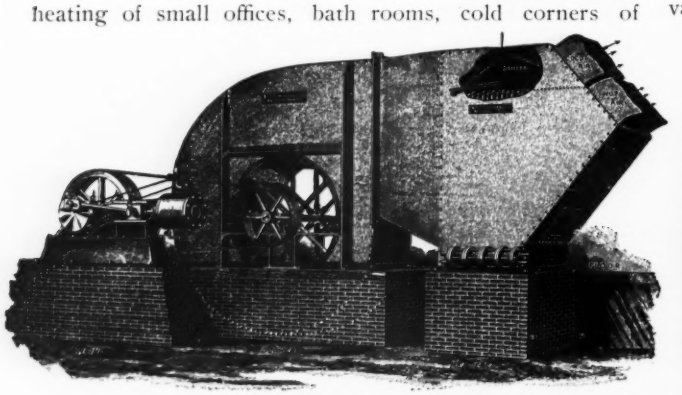


Fig. 19.

rooms, electric cars, etc., and is often used in rooms which are not accessible to steam or warm air pipes.

It has the special advantage of being instantly available and the amount of heat is regulated at will.

The heaters are perfectly clean, do not vitiate the air and are portable. They are usually arranged in sections so that the amount of heat can be regulated as desired. They are made up of resistance coils embedded in asbestos or some other form of non-conducting material.

Figs. 21, 22 and 23 show different forms of electric radiators; the latter is especially designed for car heating.

Principles on Ventilation.

Closely connected with the subject of heating is the problem of maintaining air of a certain standard of purity in the various buildings occupied.

The introduction of pure air can only be done properly in connection with some system of heating, and no system of heating is complete without a supply of pure air, depending in amount upon the kind of building and the purpose for which it is used.

Composition of the Atmosphere.

It is a well-known fact that atmospheric air is not a simple substance, but a mechanical mixture. Oxygen and nitrogen, the principal constituents, are present in very nearly the proportion of one part of oxygen to four parts of nitrogen by weight. Carbonic acid gas, the product of all combustion, exists in the proportion of 3 to 5 parts in 10,000 in the open country. Water in the form of vapor, varies greatly with the temperature and the exposure of

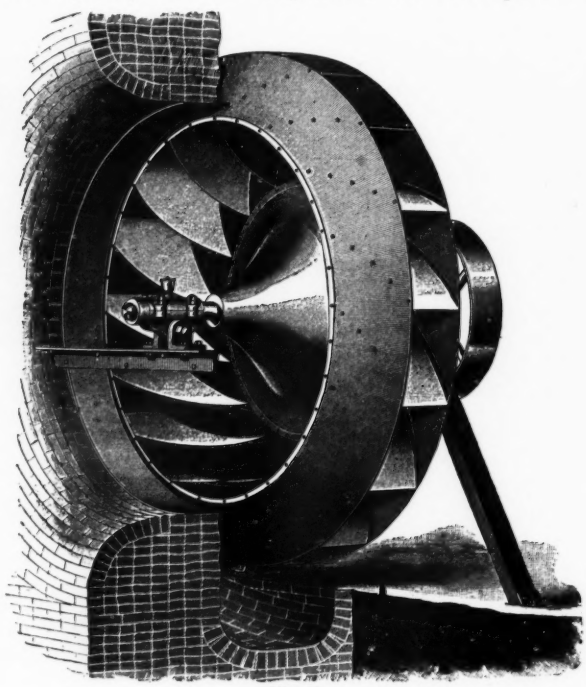


Fig. 20.

the air to open bodies of water. In addition to the above, there are generally present, in variable but exceedingly small quantities, ammonia, sulphuretted hydrogen, sulphuric, sulphurous, nitric and nitrous acids, floating organic and inorganic matter and local impurities. It also contains ozone which is a peculiarly active form of oxygen, and lately a new constituent called argon has been discovered.

Oxygen is one of the most important elements of the air, so far as both heating and ventilation are concerned.

It is the active element in the chemical process of combustion and also of a somewhat similar process which takes place in the respiration of human beings. Taken into the lungs it acts upon the excess of carbon in the blood, and possibly upon other ingredients, forming chemical compounds which are thrown off in the act of respiration or breathing.

The principal bulk of the atmosphere is nitrogen, which exists uniformly diffused with oxygen and carbonic acid gas. This element is practically inert in all processes of combustion or respiration. It is not affected in composition either by passing through a furnace during combus-

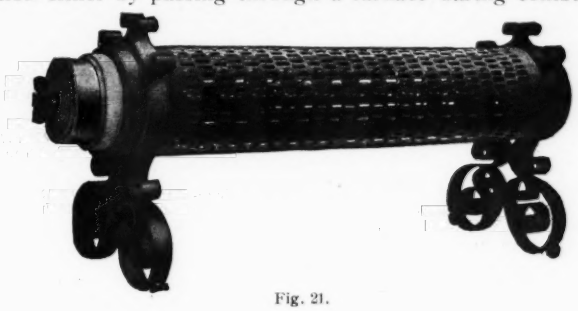


Fig. 21.

tion or through the lungs in the process of respiration. Its action is to render the oxygen less active and to absorb some part of the heat produced by the process of oxidation.

Carbonic acid gas is of itself only a neutral constituent of the atmosphere, like nitrogen, and contrary to the general impression its presence in moderately large quantities (if uncombined with other substances) is neither disagreeable nor especially harmful. Its presence in the air, however, provided for respiration, decreases the readiness with which the carbon of the blood unites with the oxygen of the air, and therefore, when present in sufficient quantity, may cause indirectly not only serious, but fatal results. The real harm of a vitiated atmosphere is caused by its other constituent gases and by the minute organisms which are produced in the process of respiration. It is known, however, that these other impurities exist in fixed proportion to the amount of carbonic acid present in an atmosphere vitiated by respiration. Therefore, as the relative proportion of carbonic acid may be easily determined by experiment, the fixing of a standard limit of the amount in which it may be allowed also limits the amounts

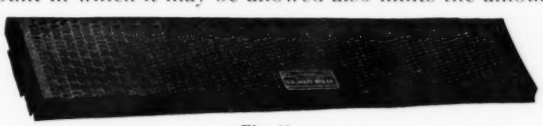


Fig. 22.

of other impurities which are found in combination with it.

When carbonic acid is present in excess of 10 parts in 10,000 parts of air, a feeling of weariness and stuffiness, generally accompanied by a headache, will be experienced; while with even 8 parts in 10,000 parts a room would be considered close. For general considerations of ventilation the limit should be placed at 6 to 7 parts in 10,000, thus allowing an increase of 2 to 3 parts per 10,000 over that present in outdoor air, which may be considered to contain four parts in 10,000 under ordinary conditions.

Analysis of Air.

The amount of carbonic acid present in the air may be readily determined, to a sufficiently close degree for practical purposes, in the following manner:

Six clean, dry and tightly corked bottles, containing respectively 100, 200, 250, 300, 350 and 400 cubic centimeters, a glass tube containing exactly 15 cubic centimeters

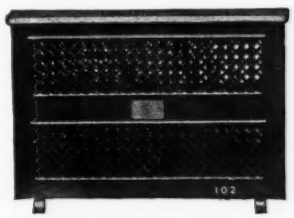


Fig. 23.

to a given mark, and a bottle of perfectly clear, fresh lime-water make up the apparatus required. The bottles should be filled with the air to be examined by means of a hand-ball syringe. Add to the smallest bottle 15 cubic centimeters of the lime-water, put in the cork and shake well. If the lime-water has a milky appearance the amount of carbonic acid will be at least 16 parts to 10,000. If the contents of the bottle remains clear, treat the bottle of 200 cubic centimeters in the same manner; a milky appearance or turbidity in this would indicate 12 parts in 10,000. In a similar manner, turbidity in the 250 cubic centimeter bottle indicates 10 parts in 10,000; in the 300, 8 parts; in the 350, 7 parts, and in the 400, less than 6 parts. The ability to conduct more accurate analyses can only be attained by special study and a knowledge of chemical properties and methods of investigation.

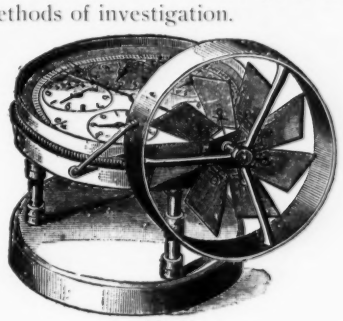


Fig. 24.

The amount of air required to maintain the standard of purity can be very easily determined provided we know the amount of carbonic acid given off in the process of respiration. It has been found by experiment that the average production of carbonic acid by an adult at rest is about .6 cubic feet per hour. If we assume the proportion of this gas as 4 parts in 10,000 in the external air, and are to allow 6 parts in 10,000 in an occupied room, the gain will be 2 parts in 10,000, or in other words there will be 2-10000 =.0002 cubic feet of carbonic acid mixed with each cubic foot of fresh air entering the room.

Therefore, if one person gives off .6 cubic feet of carbonic acid per hour it will require .6 ÷ .0002 = 3000 cubic feet of air per person to keep the ain in the room at the standard of purity assumed, that is, 6 parts of carbonic acid in 10,000 of air.

Air is moved for ventilating purposes in two ways; first, by expansion due to heating; and second by mechanical means. The effect of heat on the air is to increase its volume and therefore lessen its density or weight, so that it tends to rise and is replaced by the colder air below. The available force for moving air obtained in this way is very small and is quite likely to be overcome by wind or external causes. It will be found in general that the heat used for producing velocity in this manner, when transformed into work in the steam engine, is greatly in excess of that required to produce the same effect by the use of a fan. Ventilation by mechanical means is performed either by pressure or suction. The former is used for delivering fresh air into a building and the latter for removing the foul air from it. By both processes the air is moved without change in temperature, and the force for moving must be sufficient to overcome the effects of wind or changes in outside temperature. Some form of fan is used for this purpose.

The velocity of air in ventilating ducts and flues is measured directly by an instrument called an anemometer. A common form of this instrument is shown in Fig. 24. It consists of a series of flat vanes attached to an axis and a series of dials. The revolution of the axis causes motion of the hands in proportion to the velocity of the air, and the result in feet per minute can be read directly from the dials.

Report of the Committee on Standards: Code for Testing Direct Radiation Heating Plants.

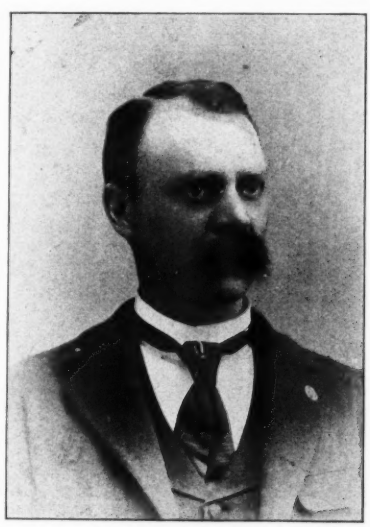
Read by J. H. Kinealy, before the American Society of Heating and Ventilating Engineers.

Object of the Code.

IN this country it is customary for the owners of buildings to require that when a contractor installs a heating system he shall guarantee that the system will be able to create and maintain a temperature of 70 degrees inside of the building when it is zero outside, and further that the contractor shall agree that the system shall not be paid for until it has been tried and the guarantee satisfied by actual trial during zero weather. This works a hardship on the contractor, inasmuch as he is often required to wait a long time, sometimes until two winters shall have elapsed before he receives payment for his work. And in order that this waiting may be obviated, and that instead of the contractor agreeing to wait until the system is tried and its heating capacity actually proved during zero weather, your committee proposes that the heating capacity of direct radiation heating systems shall be determined by a test made in accordance with the following Code. In this Code it is assumed that the heating system shall be tested when it is warmer than zero outside, by an engineer or some other person competent to make such test, and that if the test be made in accordance with the Code and shall show satisfactory results when so made, this test is to take the place of a test or trial of actual service during zero weather.

Basis of the Code.

The requirements of this Code are based upon the assumption that when there is not a very great variation in the difference between the temperature of the steam or water in a radiator and the temperature of the air in the room where the radiator is, the heat emitted per hour per square foot of surface per degree difference between the temperature of the steam in the radiator and the temperature of the air in the room, is a constant quantity; and that the heat transmitted through the cooling walls and windows of buildings per hour per square foot of surface per degree difference between the temperature of the air inside and that of the air outside of the room, is a constant quantity. It is probable that these assumptions are not strictly true, but the deviation from the truth is so small that for all practical purposes they may be considered as true, and it is also probable that we do not know the coefficients for the transmission of heat from radiators to the air surrounding them, or from the air inside of a room to the air outside of a room, with a sufficient degree of accuracy to enable us to calculate exactly what the transmission of heat in any given case will be. Further, as the object of the Code is to enable systems to be tested in comparatively warm weather, when it is probable that there will not be such severe winds as would prevail in zero weather, it is probable that the deviation from the truth in the assumptions as to the transfer of heat from radiators to the air in a room and from the air in a room to the air outside, are such that the tests made in comparatively warm weather will err, if at all, in such a way



WM. ATTLESEY, Cincinnati, O.

as to introduce a slight factor of safety, such as should be introduced any way to make allowances for the cold, high winds which usually prevail or which may prevail during zero weather.

On the assumptions made then, if we let T represent the temperature of the steam or hot water in the radiator, t, the temperature of the air in the room, and t_0, the temperature of the air outside, we have

$$(1) \quad \ldots \quad \frac{T - t}{t - t_0} = k.$$

where k is a constant quantity for each building and heating plant. And if, as is generally the case, t is to be 70 when t_0 is to 0, we shall have as the expression for the value of k

$$(2) \quad \ldots \quad k = \frac{T - 70}{70},$$

From equations (1) and (2) we get

$$(3) \quad \ldots \quad t = 70 + \frac{(T - 70)\, t_0}{T}$$

Equation (3) enables us to determine the temperature, t, which should be maintained inside of a building when the temperature outside, t_0, is higher than zero, and when the temperature of the steam or water in the system is T. This equation assumes that the test is made with the same temperature of steam or hot water in the radiators which would be used in order to keep the air of the building at 70 degrees during zero weather. It is not desirable to have the temperature of the steam or hot water in the radiators during the test different from that which it would have to be under the guarantee of the contract under which the system was installed, in order to maintain 70 degrees during zero weather. This is so because experience and tests have indicated that the heating effects of radiators vary somewhat with the temperature of the steam or hot water in them; and, hence, the committee deems it safest to make the test using exactly the same temperature of steam or hot water in the radiators that would be used or would be allowed to be used, under the contract, to maintain a temperature of 70 degrees inside when it is zero outside.

As has been said before, it is probable that the amount of heat emitted by a given radiator per square foot of heating surface per hour per degree difference between the temperature of the steam and the temperature of the air in the room, is not exactly constant for all differences of temperatures, but when this difference does not vary through a wide range, it may be assumed that the heat emitted per degree difference of temperature per hour per square foot of surface, is constant, and equation (3) has been deduced upon the supposition that the difference between T, the temperature of the steam or hot water in the radiators, and t, the temperature of the air in the room during the test, is not very different from what it would be when the temperature of the air inside is 70 degrees and the air outside is zero. Your committee is of the opinion that the difference between T and t during a test should not be greater than 0.8 of the difference between T and t during zero weather. That is to say, if a heating plant be installed under a guarantee that when the temperature of the steam in the radiators is 220 degrees a temperature of 70 degrees will be maintained in the building when it is zero outside, no test of the system should be made to determine its heating capacity when the difference between the temperature of the steam in the radiator, 220 degrees, and the temperature, t, maintained in the building during the test shall be less than 0.8 of the difference between 220 and 70, or 120 degrees. This will necessitate that tests, to determine the heating capacity of systems, shall be made during comparatively cold weather.

For example, let it be assumed that a heating plant be installed under a guarantee to maintain a temperature of 70 degrees in a building when the temperature outside is zero, with a temperature of steam in the radiator of 220 degrees. Here we have the difference between 220 degrees and 70 degrees, the difference between the temperature of the steam and the temperature maintained in the room during zero weather, is 150 degrees. If now, a test be made and it be required that when the test is made the difference between the temperature of the steam in the radiator, 220 degrees, and the temperature maintained in the building, shall not be less than 0.8 of the difference between the temperature of the steam in the radiator and the temperature maintained in the building during zero weather, we have, that when the test is made, T—t must be equal to or greater than 0.8 of 150 or 120 degrees. Assuming that the difference between T and t during the test is 120 degrees, we have that t shall be equal to T—120, of 220—120=100. That is to say, the temperature in the building during the test shall not be greater than 100 degrees.

From equation (3) we have

$$(4) \quad \ldots \quad t_0 = \frac{T\,(t - 70)}{T - 70}.$$

Putting in (4) the values of T and t in this particular problem, we have

$$t_0 = \frac{220\ (100 - 70)}{220 - 70} = \frac{220 \times 30}{150} = 44.$$

That is, the outside temperature during the test would have to be 44 degrees in order that the temperature inside would be equal to 100 degrees. If now, the test should be made when the outside temperature were less than 44 degrees, the temperature inside would be less than 100 degrees. In this particular instance, if the plant is to be tested during weather warmer than zero weather, it would not, under the provisions of the Code, be allowable to test the plant when the temperature outside is higher than 44 degrees.

As a second example let us assume that a hot-water plant is installed under a guarantee to maintain a temperature of 70 degrees inside when the temperature outside is zero, with an average temperature of the water in the radiators of 160 degrees. Here we have the difference between T and t during zero weather is equal to 160—70, or 90 degrees. Assuming, as before, that the difference between T and t during a test made to determine the capacity of the plant, shall not be less than 0.8 the difference between T and t during zero weather, we have that during the test, T—t must not be less than 0.8 of 90, or 72 de-

grees. If we assume then, that during the test, T—t is equal to 72 degrees, we have that t is equal to T—72. And since T is 160, we have that the greatest temperature to be maintained in the building during a test shall be 160—72, or 88 degrees. From equation (4) we see that when T is 160, and t is 88,

$$t_0 = \frac{160\ (88 - 70)}{160 - 70} = 32.$$

If now, the test had been made when the outside temperature was greater than 32 degrees, the inside temperature would have been higher than 88 degrees, but according to the requirements of the Code such a test would not be allowable. If the test were made when the outside temperature was less than 32 degrees, the temperature inside would be less than 88 degrees, and such a test would be within the requirements of this Code. In other words, the rules of the Code say that when the average temperature of the water in the radiators of a hot-water heating system of a building be 160 degrees in order to maintain a temperature of 70 degrees in the building during zero weather, no test of the plant shall be made to determine its efficiency when the temperature outside is higher than 32 degrees.

The two requirements which are indeed the basis of the Code for testing direct radiation heating plants in order to determine their capacities are:

1. That during the test the temperature of steam or water maintained in the radiators shall be the same as that allowed by the contract to be maintained in order to maintain a temperature of 70 degrees in the building when it is zero outside.

2. That during the test the difference between the temperature of the steam or water in the radiator and the temperature maintained inside of the building, shall not be less than 0.8 of the difference between the temperature of the steam or water in the radiator and the temperature maintained in the building when it is zero outside

The following table shows the maximum outside temperatures during which tests may be made under the requirements of the Code, in order to determine the capacity of a plant, and also the temperature which should be maintained inside during a test when the temperature outside is the maximum allowed by the Code.

TABLE I.

(1) Temperature of the steam or water in the radiators, as required by contract.	(2) Maximum allowable temperatures during a test.	(3) Temperature which should be maintained in the building when outside temperature is as given in column (2).
160	32	88
180	36	92
200	40	96
220	44	100
240	48	104

This table shows that it would not be allowable under requirement 2 to make a test to determine the capacity of a heating plant when the temperature outside is higher than 44 degrees unless the temperature allowed under the contract to be maintained in the radiators in order to maintain a temperature in the building of 70 degrees during zero weather be less than 220 degrees. But even when the temperature allowed in the radiators to maintain a temperature of 70 degrees in a building during zero weather, be as high as 240 degrees, it would not be permissible under the Code to make a test for determining the capacity of the heating system when the temperature outside is greater than 48 degrees.

Your committee also deems it advisable to include in the Code, a third requirement as follows:

3. That no test to determine the heating capacity of a system, to maintain a temperature of 70 degrees in a building during zero weather, shall be made when the temperature outside is greater than 48 degrees, even although the allowable temperature under requirement 2 of the Code should be greater than 48 degrees.

The object of this requirement is so apparent that explanation is needless. It is evident that heating systems should be tested, if not during cold weather, at least during weather when the temperature outside is less than 48 degrees.

Requirements of the Code.

When a direct radiation, steam, or hot-water heating plant of a building is tested to determine whether its heating capacity is sufficient to maintain a temperature of 70 degrees in the building when it is zero outside, the following requirements shall be observed during the test:

1. The temperature of the steam or water maintained in the radiators shall be the same as that allowed by the contract to be maintained in order to maintain a temperature of 70 degrees in the building when it is zero outside.

2. The difference between the temperature of the steam or water in the radiator, and the temperature maintained inside of the building during the test, shall not be less than 0.8 of the difference between the temperature of the steam or water in the radiator and the temperature to be maintained in the building when it is zero outside.

3. In no case shall the temperature outside be greater than 48 degrees, even although the allowable temperature under requirement 2 should be greater than 48 degrees.

4. The temperature which should be maintained in each room or each floor of the building during a test, in order that the capacity of the heating plant shall be sufficient to maintain a temperature of 70 degrees in each room of the building when it is zero outside, shall be calculated by the following equation:

$$t = 70 + \frac{(T - 70)\ t_0}{T},$$

where t is the temperature which should be maintained in the building during the test; T is the temperature of the steam or hot water in the radiators, and t_0 is the outside temperature during the test.

If the temperature of the building, or of a floor or a room of the building, during a test be less than the value of t given by the above equation, the heating system shall be considered as not sufficiently large to maintain a temperature of 70 degrees when it is zero outside.

The Temperature, T. of the Steam or Water in the Radiators.

In the case of a steam-heating apparatus, the temperature of the steam in the radiator shall be arrived at by determining the pressure of the steam in the main supply

pipe by means of a correct steam-pressure gauge and then the temperature, as given by a steam table, corresponding to the average of the observed pressures shall be taken as the temperature of the steam in the radiator.

Readings of the pressure gauges shall be made at intervals during the test of not more than 30 minutes.

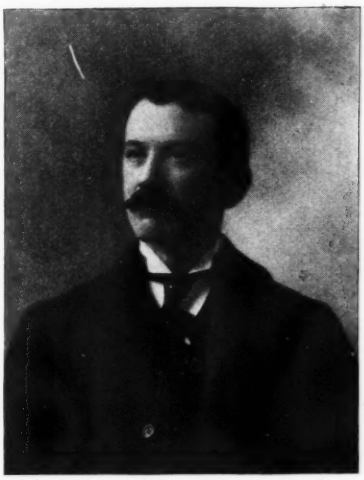
In the case of hot-water heating systems the temperature of the water in the radiators shall be arrived at by measuring close to the hot-water heater, the temperature of the water in the main supply pipe, and measuring also close to the heater the temperature of the water in the main return pipe, and the average of these shall be considered as the temperature of the water in the radiators. If there be more than one supply pipe and more than one return pipe to the systems, the temperature of the water in at least two supply pipes shall be observed, and also the temperature in at least two return pipes; and the average of the temperatures observed in the supply pipes and the temperatures observed in the return pipes shall be taken as the temperature of the water in the radiators.

The temperatures shall be obtained by thermometers specially made for the purpose of indicating the temperature of water in hot-water mains, or by thermometers placed in thermometer cups in the pipes. Readings of these thermometers shall be made at intervals during the test of not more than 30 minutes.

The Inside Temperature.

The temperature maintained in a building during a test shall be determined by taking observations of the temperature in different parts of the building on each floor.

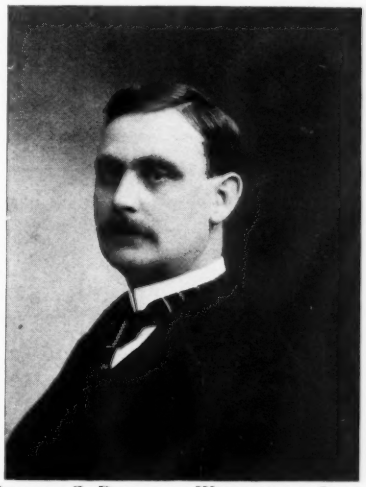
When the building is only one story high, temperature observations shall be made on the first floor; when the building is two stories high, temperature observations shall be made on the first and second floors; when the building is more than two and less than six stories high, temperature observations shall be made on the first, third



P. F. Sullivan, of Baltimore.
Vice President for Maryland N. A. M. P.

and fifth floors; when the building is more than six and less than twelve stories high, temperature observations shall be made on the first, fourth, seventh and tenth floors; and when the building is more than twelve stories high, temperature observations shall be made on the first, sixth and eleventh floors, and on each succeeding fifth floor above.

Not less than three thermometers shall be used on any one floor for indicating the temperature of that floor. The location of the thermometers must be determined for each particular case, although it is recommended that one thermometer be placed in the coldest room and one in the



Charles G. Belfit, of Watertown, Conn.
Secretary of the Conn. M. P. A.

warmest room of each floor. These rooms will usually be those having a northwest exposure, and those having a southeast exposure.

The average of the temperatures observed in any room during a test shall be considered the temperature of that room; the average of the temperatures of the rooms on a floor shall be the temperature of that floor, and the average of the temperatures of the different floors shall be considered the temperature of the building.

The thermometers used for determining the temperature inside of the building shall be all glass thermometers with the graduations on the stem. They shall be graduated to read to single degrees Fahr.

The thermometers shall be hung about four and a half or five feet above the floor, but not closer than two feet to an outside wall or window.

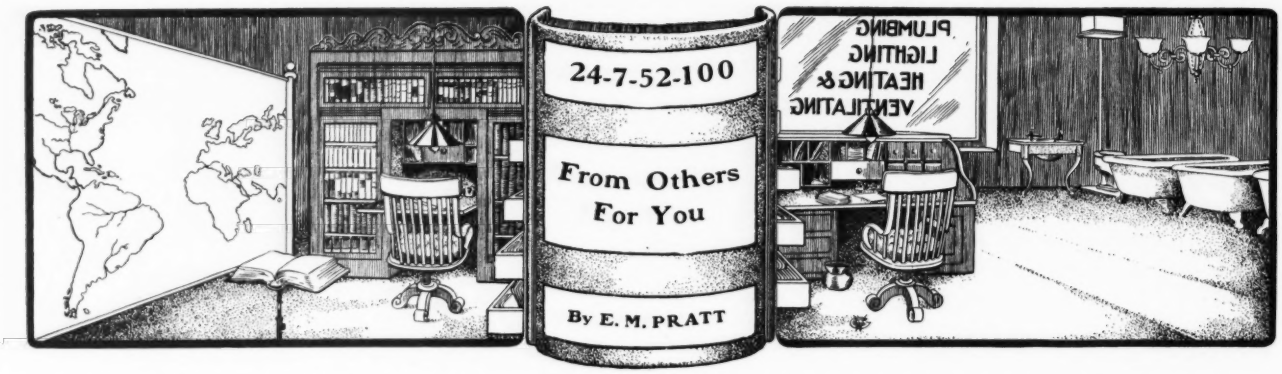
Readings of the thermometers shall be made at intervals during the test of not more than 30 minutes.

The Outside Temperature.

The outside temperature shall be obtained by taking observations on thermometers placed in the open air. Not less than two thermometers shall be used for determining the outside temperature, and they shall be hung so as to be shielded from the direct rays of the sun, and to be as much as possible in the open. They shall be hung so that the bulbs shall not come in direct contact with the wall of any building, shed, or fence. They shall be all glass thermometers with the graduations on the stem and shall be graduated to read to single degrees Fahr.

The average of the readings of the outside thermometers shall be considered as the outside temperature, t_o, to be used for determining, by the equation of requirement 4, the inside temperature, t, which should be maintained in the building during the test.

Readings of the thermometers shall be made at intervals during the tests of not more than 30 minutes.



Let the big book of drawers full of envelopes represent the medium between you and me. Imagine that the drawers slide both ways and that the envelopes are alphabetically indexed on both sides. My work is to go into all the world to collect better personal, professional and commercial methods useful to you in your work during the day, the week, the year, the century. This page is for the exchange of questions, answers and experiences.

GOING into the office of a president I began talking to him about the expense of errors of buyer and seller. He knew more about it than I did, but I had more faith in a solution than he did. While my faith was based on intuition rather than any cut and dried plan, I interested him, and later also the general manager, and gradually grew the Anti-Blunder Bureau, producing the copyrighted report, "Blunders and Breaks—the enemy of errors and mistakes," from which the following extracts are taken:

FROM PAIN TO PIN: The dentist was causing him pain and expense because the tooth was being repaired. The tooth was being repaired because it was broken. It was broken because he hit it on the top of a chair. He hit it because he was trying to find a pin on the floor in the dark, dark night. To see him was to say: "Moral—strike a light."

FOR FORTY DOLLARS: My old preceptor's preceptor had done a hard day's riding in the country when he found on his slate late in the evening a call to a distant house in a lonely region. As that call would make him his best day in booking, or $40, he started out very weary, but ambitious. On reaching the house and knocking several times an upper window opened and some one asked him his business. He explained. The some one advised him to clear out if he wanted to save trouble. He went home.

AN EXAMPLE OF HABIT: A man who was being tried by his brothers for a habit of wild and extravagant statement said in his own behalf: "My friends, you know how much I regret my words. It is a great torture to me. I have shed barrels of tears over it."

ONLY A COINCIDENT: When I went to the post-office for a money order for the copyright on "Blunders and Breaks" the lady clerk insisted on paying me a quarter, though I handed her the right sum. She was convinced when she found a half dollar among the dollars.

WHY I HOPE: I wish more of my experiences had been real experiments in place of blunders. But a German friend told me when we stopped making blunders we stopped growing, and that encouraged me a little.

TOO GOOD TO BE TRUE: An honest man says he saw it. A waitress spilt the first course in a young man's lap, which was newly pantsed. He smiled and told her he had had quail on toast, but never before soup on pants.

BE SURE YOU ARE RIGHT: Very smart people have retreated in confusion after being tremendously positive. Investigate your own reasoning for your own safety.

LOST SHIRTS: A very smart man lost several shirts, but in time discovered that he had all of them on himself. In his intensity of thought he had not taken time to remove a shirt before putting a clean one on.

HARD TO BELIEVE: 1. That any one would try to start an orchard by planting dried apples.

2. That any one would stock a mule stock farm with mules.

3. That people would make a hole in the ground to fill another and keep on till they ran the hole out of town.

4. That a man would move his office furniture and also his telephone without notifying the telephone company and then complain to the company that the telephone was no good—that it had not worked since he moved. But this last act is on record and duplicated.

EXTREMES: The greatest thing a human being can do is to really forgive a real enemy and the smallest thing possible for us to do is to blame another for our own blunders.

THE MAN HIMSELF STUDIES: "What is the cause of criminal carelessness?" Two years ago a man asked me the above question. He had been having trouble and I have been thinking about the subject ever since. It may be due to ignorance. Some claim that people are not as good nor as bad as they appear to be—if we knew more we would be better. But we will know more if we are any good and have our goal in the right place. The idea that experience is a dear school, but fools will learn in no other, might be revised to read: It is a wise man who learns by experience; fools never learn. Though a man is not to be blamed for being born ignorant, he can be blamed for remaining ignorant, and continued or repeated carelessness may be called criminal.

HERE IS ANOTHER: Scattered attention is surely a cause of errors. Some think about their play during work hours, and during play hours they worry about their work, and as a result they neither play nor work. It is not business to think of things at the wrong time. Nor is it business to think too far ahead or too far behind. The former is for prophets and the latter for historians. Those who make big money study history and read the future, but the average man must look steadily at today and keep his head and hands busy.

Seventh Annual Convention of the Pennsylvania Association of Master Plumbers, at Philadelphia, April 16, 1901.

THE Pennsylvania Association of Master Plumbers convened for their seventh annual session at Philadelphia on Tuesday, April 16th. The delegates assembled at Lu Lu Temple of the Order of the Mystic Shrine on Spring Garden street, just off North Broad street, and promptly at 11 o'clock State President Louis J. Sommer called the convention to order and appointed James H. Shea, of Philadelphia, sergeant at arms. He also announced as committee on credentials John V. McNally, Harry L. Righter and Howard Smith, all of Philadelphia.

President Sommer, though suffering from a cold which affected his throat, expressed in good voice his pleasure in being able to preside over such a goodly concourse and on behalf of the city of Philadelphia welcomed the visiting delegates. He then introduced President George F. Uber, of the Philadelphia Association, who was also chairman of the local committee of arrangements. Mr.

LOUIS J. SOMMER, Philadelphia.

Uber was greeted with applause as he stepped forward and in a modest but hearty manner bid the visitors a cordial welcome and extended them the hospitality of Philadelphia. Wm. H. Doyle, the state's representative in the national association, made a short but timely address and was followed by Councilman Wm. McCoach in a few well-chosen remarks. At this point President P. J. Tierney, of the national association, who had just arrived from his home in Providence, entered the hall and was escorted to a seat on the platform and introduced to the convention by State President Sommer. Mr. Tierney gracefully acknowledged the applause which greeted him and stated that he would have something to say later on about the New York conference resolutions. State Secretary Robert J. McNally read a communication from York, Pa., regarding regulations recently promulgated by the York Gas Company. On motion consideration of same was laid over as new business. A communication was presented calling attention to the following bill which has lately been introduced in state legislature:

An Act to protect the property of natural gas, electric and electric railway companies, and other furnishers of gas and electricity, and interest of consumers of gas and electricity, and to provide penalties for all violations of the provisions of this act.

Section 1. Be it enacted by the Senate and House of Representatives of the commonwealth of Pennsylvania in general assembly met, and it is hereby enacted by the authority of the same, that from and after the passage of this act, it shall be unlawful for a person to wilfully, or with intent to injure or defraud, connect a tube, pipe or wire, or other instrument or contrivance with a pipe or wire used for the conducting or supplying illuminating gas, fuel, natural gas or electricity in any burner, office lamp or motor where the same is or can be burned or used without passing through the meter or instrument provided for registering the quantity consumed.

Section 2. To obstruct, alter, injure or prevent the action of a meter or other instrument used to measure or register the quantity of illuminating, fuel, natural gas or electricity consumed in a house or apartment, or at the office or burner, lamp or motor, or by consumer or other person or persons other than an inspector or deputy inspector of gas meters, or an employe of the company owning gas or electric meter; to willfully detach or disconnect such meter, or make or report any test of or examine for the purpose of testing any such meter so detached, or,

Section 3. To in any manner whatever change, extend, or alter any service pipe, wire or attachment of any kind connecting or through which natural gas or artificial gas or electricity is furnished from the main gas pipes or wires of any person, company or corporation without first procuring from said person, company or corporation written permission to make change, extension or alteration; or,

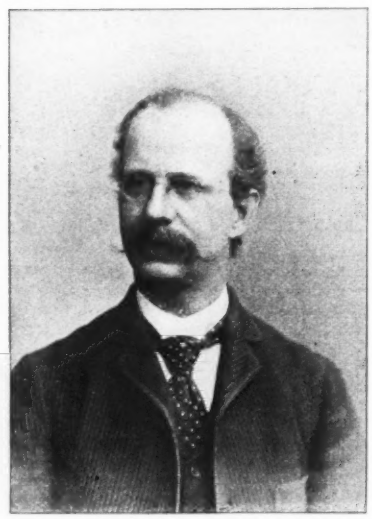
Section 4. To make any connection or reconnection with the gas mains, service pipes or wires of any person, company or corporation furnishing to consumers natural or artificial gas or electricity; to turn on or off or in any manner interfere with any valve or stop-cock or other appliances belonging to such person, company or corporation and connected with its service or other pipes or wires, or to enlarge the orifice or mixers, or to use natural gas for heating purposes except through mixers or electricity for any purpose without first procuring from such person, company or corporation a written permit to turn on or off such stop-cock or valve, or to make such connection or reconnection, or to enlarge the orifice of mixers, or to interfere with the valves, stop-cocks, wires or other appliances of such person, company or corporation as the case may be.

ROBT. J. MCNALLY, Germantown.

Section 5. That any person violating any of the provisions of this act shall be deemed guilty of a misdemeanor and on conviction thereof shall be sentenced to pay a fine not exceeding five hundred ($500), and to undergo an imprisonment not exceeding one year, or both, or either, in the discretion of the court.

This bill provoked an animated discussion which was participated in by Wm. McCoach, Geo. F. Uber and E. Frank

Paullin, of Philadelphia, and David Horn, of York. The proposed law found one supporter in Mr. Paullin, who could see no reason why electricians should be accorded privileges which are denied plumbers under similar circumstances. Wm. H. Doyle, of Philadelphia, pointed



W. T. CLARK, Philadelphia.

out in a few clear-cut sentences that while the measure was all right in the main, its strict construction would put one in jeopardy for the most trifling manipulation of any fixture connected with lighting apparatus of any kind. A motion was made by Mr. Evans, of Scranton, as follows: "I move you that we, as a body protest against the passage of this act and to use our individual influence with our representatives to prevent its passage in the legislature."

Sam'l W. Barnes proposed an amendment that the protest be signed by the officers and members of the convention

Next in order came reports of select committees. No member of the sanitary committee was present. Mr. Barnes, chairman of the legislative committee, stated that no business had been before them for consideration except the proposed gas and electric measure, which had just been under discussion.

The apprenticeship committee had nothing of especial importance to report.

The annual address of President Sommer was read by Secretary McNally and received by the convention with warm approval. The secretary then submitted his own report, which, on motion, was received and referred to the executive session. Mr. McNally stated that all membership per capita dues have been paid up in full without exception. The treasurer's report was also read by the secretary. It showed the financial affairs of the association to be in a most satisfactory condition, and was referred to executive session.

President Sommer appointed an auditing committee consisting of Sam'l W. Barnes, of Philadelphia; James B. Doyle, of Scranton, and David Horn, of York. A communication was read from National Secretary James C. Conroy, expressing regret that a previous engagement prevented him from accepting the invitation to be present at the convention. Several other letters of regret were also read by the secretary.

List of delegates: Philadelphia—Geo. F. Uber, Harry L. Righter, John V. McNally, Gregor Drummond, S. Louis Barnes, Harvard Smith, Smalley & Hunt, Wm. J. Beatty, J. T. Heirst, J. F. Dwyer, Howard Nielson, Jos. V. Reagan, Sam'l R. Smith, Walter Jones, Sam'l W. Barnes, James H. Shea, Albert M. Hicks, Dennis V. Kennedy, Wm. Groeling, Clark Bros., R. H. Watson, Walter R. Ross, E. Frank Paullin. Pittsburg — M. Purtill, Mack Snively. Scranton—J. F. Evans, Thos. W. Cleary, James B. Doyle, H. J. G. Wilkesbarre—E. W. Erath, Wm. Raiser, J. U. Leim & Co. Lancaster—E. Silas Overden, Henry Will, J. G. Coulter. Allentown—John H. Birchall. Pottsville—Thos. M. Lawrence, Geo. M. Smith & Son. Erie—Wm. F. Butler, John H. Lyons. Altoona—Chas. A. McAleer, O. L. McCartney. Reading—H. S. De Hart, Benj. B. Geich. York—David Horn, Edwin P. Heesed.

Following is a list of the Philadelphia association's delegates to the national convention to be held in Kansas City in June next:

A. M. Hicks, Wm. McCoach, E. P. Brown, J. E. Evanson, S. Louis Barnes, R. J. Hoben, R. J. McNally, Howard Smith, James H. Shea, G. Wallace Smith, C. W. Groeling, E. Frank Paullin, Frank W. Henry, Richard H. Watson, R. Drummond, E. H. Mackay, Harry Mellon, T. J.

J. H. BIRCHALL, Allentown.

Barry, Wm. Harkness, J. P. Cleary, R. G. Lougherty, M. F. Elliott, D. R. Burns, H. L. Righter, Wm. H. Doyle, A. G. Bond, S. W. Barnes, J. Gormly, I. T. Hirst, J. J. Harnett, H. Johnson, I. B. Thorn, Jos. Hubley, Jno. V. McNally.

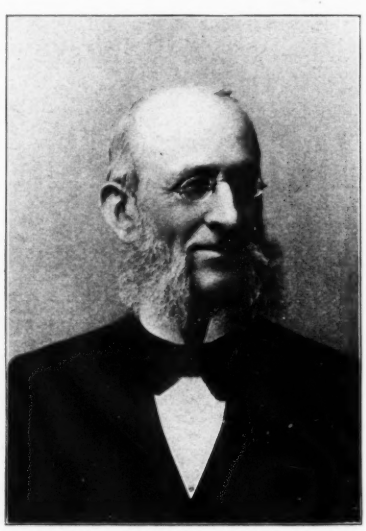
At 12:30 o'clock a recess was taken and the members of the convention adjourned to the hall on the ground floor, where it had been announced that a "lunch" would be served, but the plenteous provision of substantials and delicacies which was dispensed surely deserved a more pretentious appellation. When the wants of the inner man had been satisfied the delegates and visitors were lined up on the front steps of the building and a group picture was taken by Jas. L. Dillon, one of the Quaker City's prominent photographers.

Refreshed, revivified and re-enforced, the assemblage seated itself for the afternoon session, which got down to business at 3:15 p. m. Mr. Clark, of Philadelphia, presented an amendment to the section of the by-laws relating to the per capita tax as follows:

It shall be the duty of all local secretaries to send to the state secretary on the first day of March and on the first day of September following the sum of one dollar and a half for each member, to cover state and national per capita tax. After some discussion it was decided to lay the amendment on the table. James H. Shea, of Philadelphia, took the platform and delivered a telling address on the subject of "The Twentieth Century Plumber." Mr. Shea brought out the fact that while no supply house is allowed to sell goods to an irresponsible plumber on the indorsement or security of a builder or contractor of any kind, many small or new plumbers procure supplies on guarantee furnished by bond and security companies in which case it is impossible to ascertain who secures the bond company. This subject elicited an interesting discussion which was carried on by President Sommer, Wm. H Doyle, Wm. McCoach and others.

Mr. Doyle, of Philadelphia, spoke in lucid, logical and convincing terms in favor of upholding the New York conference resolutions in their entirety and on his motion a resolution to indorse same was unanimously carried by the convention. A suggestion was offered that the convention authorize the publication of a pamphlet embracing its entire proceedings, but Mr. Doyle pointed out the fact that such would be a very costly proceeding, and in view of the fact that the leading journals of the trade would present full and adequate reports, he deemed the expense of the proposed pamphlet practically superfluous.

The next matter on the program was the election of officers for the ensuing year. Howard Smith and H. L. Righter, of Philadelphia, and Thos. M. Lawrence, of Pottsville, were appointed tellers. Sam'l W. Barnes, of Philadelphia, nominated Louis J. Sommer, of Philadelphia, who has so well and faithfully presided over the interests of the association during the year just ended. The nomination was heartily seconded and a motion immediately carried to close nominations.

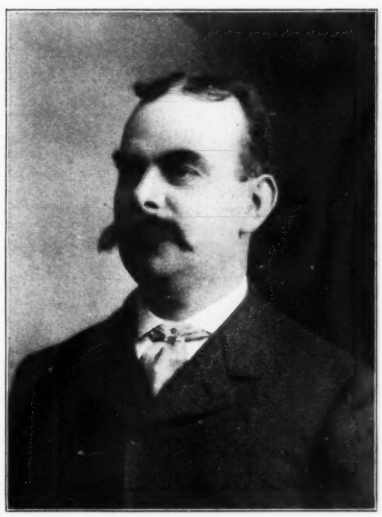


SAMUEL W. BARNES, Philadelphia.

For the office of first vice-president the worthy incumbent, James B. Doyle, of Scranton, was renominated and his nomination was eloquently seconded by Wm. H. Doyle, of Philadelphia, who paid a glowing tribute to the unselfish constancy of his namesake from Scranton. No other name was put forward, and Mack Snively, of Pittsburg, and O. L. McCartney, of

Altoona, were named as the other two vice-presidents, with equal unanimity. The untiring services of Robert J. McNally, of Germantown, Philadelphia, were recognized by an unopposed renomination for the secretaryship, and the same courtesy was extended to Treasurer John H. Birchall, of Allentown. The secretary was instructed to cast one vote for the convention for all these candidates. The only thing in the nature of a contest was for the appointment of the two delegates-at-large to the national convention at Kansas City. Three nominations were made, viz.: Robt. J. McNally, of Philadelphia; James B. Doyle, of Scranton, and S. Louis Barnes, of Philadelphia. A ballot resulted in the selection of the two first named by the following vote: McNally, 36; Doyle, 34; Barnes, 31.

The complete list of officers elected is as follows: President, Louis J. Sommer, of Philadelphia; vice-presidents, James B. Doyle, of Scranton; Mack Snively, of Pittsburg; O. L. McCartney,



GEO. F. UBER, Philadelphia.

of Altoona; Secretary, Robert J. McNally, of Philadelphia; treasurer, John H. Birchall, of Allentown; delegates-at-large, R. J. McNally, of Philadelphia; James B. Doyle, of Scranton. On motion of President Sommer a vote of thanks was tendered National President Tierney for his presence and assistance. Thanks were also voted to the local association for their hospitality and courtesies, and to "Domestic Engineering," and other press representatives.

An extended debate was had on the selection of a city for meeting place of next annual convention, the final decision being to leave the matter in the hands of the executive committee. The business of the convention came to a close with a short but feeling speech by President Sommer, in which he expressed his appreciation of the efficient and faithful service of Secretary McNally, and heartily thanked the convention for the unsought and unexpected honor of re-election.

In the evening a sumptuous banquet, at which about one hundred and fifty persons sat down, was spread in the lower hall. The eventful day wound up with a vaudeville entertainment of rare excellence, in the main hall, which was thoroughly enjoyed by all without exception. The folowing is a copy of the well-chosen program:

VAUDEVILLE ENTERTAINMENT UNDER DIRECTION OF LUKENS & COTTER.

1. Piano Solo—H. D. Cotter.
2. Irish Comedy—Taggart & Cole.
3. Popular Songs—Lillian Tyce.
4. Black Face Comedy—Fred Alberts.
5. Popular Songs—Blanch Lawrence.
6. Monologue—Geo. H. Lukens.
7. Viola—"Oriental Dance."
8. Songs and Stories—Jas. Cole.
9. Coon Songs—Lillian Tyce.
10. Banjo Solo—Fred Alberts.
11. Song and Dance—Blanch Lawrence.
12. Humorisms—Jas. Taggart.
13. The Female Baritone—Edyth Wells.
14. A Few Minutes with Lukens.

DO YOU WANT ONE?

Every member of the Pennsylvania State Association should have a copy of the large group photograph of the officers and members of the convention, taken by Jas. L. Dillon, of 1017 Chestnut street, Philadelphia. Mr. Dillon makes a specialty of building, mercantile and group photography, and in this picture, as exhibited in the hall after the banquet, the likenesses are remarkably true. Mr. Dillon will deliver, to any address, finished copies, elegantly mounted on heavy board at $1 each, express charges prepaid.

Association News.

WILL MEET IN DETROIT.

The next regular meeting of the Central Supply Association will be in Detroit, on June 18 and 19. The Eastern Association of Manufacturers and Jobbers of Plumbing Supplies will meet there at the same time.

AUSTRALASIAN M. P.'S ASSOCIATION.

The plumbers of Australasia are taking a lively interest in the formation of a master plumbers' association, comprised of members from the different islands and provinces in that territory. Meetings have been held in Sydney, Melbourne, Wellington, New Zealand, and the officials in Melbourne are preparing exhaustive plumbing regulations for use in that city.

ANNUAL CONVENTION.

The thirteenth annual convention of the National Association of Master Steam and Hot Water Fitters will be held at Niagara Falls, N. Y., June 10th to 12th. A majority of the association voted to hold the next convention at the Falls and that city consequently was selected. Philadelphia was a close second. A large delegation will go from this city and take in the Pan-American Exposition at Buffalo at the same time. The Exposition at that season of the year will be in its most fascinating dress both artificially and aided by nature's lavish hand, and the delegates expect to enjoy a royal vacation.

N. Y. CONFERENCE RESOLUTIONS AMENDED.

Following is the text of the New York Conference Resolutions, with amendments and additions, as signed by President Tierney and Chairman Torrance on April 18, 1901. They are to be known as the Revised New York Conference Resolutions:

Whereas, We believe it would be to the best interests of the manufacturers, jobbers and plumbers of the United States, that the sale of plumbing goods be confined to master plumbers as herewith defined:

1. A master plumber is one who has an established place of business and represents the industry of plumbing, and who has qualified under state or local enactments regulating plumbing and plumbers where such exist; or, where no license is required, an individual or firm with an established place of business and representing the industry of plumbing.

2. Resolved, That we recommend the establishment of a Joint Standing Committee on Conciliation to which shall be referred all cases of dispute between the plumber and the dealer. This Committee shall be constituted by the appointment of six members, three of whom shall be named by the President of the National Association of Master Plumbers, and three by the Chairman of the National Committee of the Confederated Supply Associations. In case they cannot agree they shall submit the question to three arbitrators, chosen in the usual way.

3. That plumbing goods shall not be sold to dealers who do not confine their sales to master plumbers.

4. No material or labor shall be furnished to any building that is in default to any plumber or supply house, or where the completion of the work is delayed by a strike.

5. A manufacturer or dealer accepting a waiver of a master plumber giving permission to sell goods to a consumer, even if the commission is reserved for the plumber, is considered a violation of these resolutions.

6. Sales based on owner's or agent's guarantees or mechanic's liens are prohibited and are violations of these resolutions.

7. Manufactureres or dealers, or their representatives, in plumbing supplies, are instructed to refrain, either directly or indirectly, from estimating on any job or jobs, and the practice of taking off lists of fixtures from architect's plans and disseminating such information among the plumbing fraternity, shall be construed a violation of this article.

8. Supply houses, doing a plumbing supply business and contracting for plumbing work, directly or indirectly, are considered unjust competitors.

9. Net prices or any discounts from list prices furnished to others than those allowed to buy under these resolutions are violations thereof.

10. The practice of sending out net prices, even to master plumbers, without requests for same, is a violation of these resolutions.

11. Master plumbers shall not sell plumbing material when they do not install the same; nor shall they install plumbing material that they do not furnish. Master plumbers violating this Article shall lose their recognition as master plumbers as defined in Article 1.

12. The following are exempt from the operation of these resolutions: The United States government, state and county institutions, railroad, gas, water and electric light companies, only for such goods as are necessary for their respective lines of business.

Interpretation to Article 12.

United States Government and Its Various Departments:

May purchase plumbing goods for use in their buildings.

The above exemption does not permit contractors on government work to purchase plumbing goods unless said contractors are master plumbers as defined in Article 1.

State and County Authorities:

May purchase plumbing goods for all their institutions wherein plumbers are permanently employed.

Railroad Companies:

Are exempt for all goods used in their cars or for fitting up pumping stations or water tanks along their lines for the supply of water to locomotives.

Are permitted to buy pipe and fittings.
Gas and Water Companies:

Such exemption shall cover purchases for work on their lines only, and shall not be construed as authority to buy plumbing goods for use in any building.

Under these exemptions railroad, gas, water and electric light companies are not to buy plumbing goods for the erection of new buildings, or for the alteration of old buildings, but can buy for repairs where a plumber is permanently employed.

Car and Ship Builders:

May buy plumbing goods for use in their cars or ships, but not for plumbing in buildings.

Under these interpretations plumbing goods shall not be sold for use in the buildings of officers or employes of the governments or companies mentioned.

13. Local agreements in conflict with these national resolutions shall not be permitted.

14. The penalty for violation of these resolutions shall be left to the discretion of the arbitrators, and be commensurate with the violation and circumstances.

15. When a case comes before the national arbitration board the loser shall pay the costs of arbitration.

16. The Standing Committee on Conciliation shall be empowered to select one of their members as Treasurer and deposit with him all money collected on account of penalties imposed; and further, have the power to assess equal amounts on the two National Associations to cover their expenses.

17. Local investigation committees shall be appointed upon the request of the President or Chairman of either Association, and constituted as follows: One member shall be appointed by the President of the National Association of Master Plumbers, and one member by the Chairman of the National Committee of the Confederated Supply Associations, and shall make provisional report to the presiding officer of each Association.

18. The names of master plumbers entitled to buy plumbing materials shall be recorded by or in each city and town as agreed upon by the master plumbers and the dealers in or near said cities and towns. A list of said legitimate master plumbers shall be filed with the proper officers of each National Association. Additional names shall not be added to said list until agreed upon by the said master plumbers and the dealers in plumbing supplies. This clause shall not in any way be interpreted to interfere with the operation of Article 1, in which a master plumber is defined.

19. That any violation will be taken up and duly considered by the committee and proper action taken.

The New Western Association of Master Steam and Hot Water Fitters.

Representatives of seventy-two heating firms in the west and northwest met in Chicago on Wednesday, April 10, to carry out the proposed reorganization of the trade into a new and it is hoped, a stronger association than the Western League of which most of the firms were members, had proved to be. Time had dealt hardly with the League; the long strike and lockout among the Chicago contingent had very seriously interfered with the growth of that important local association, and the trade depression felt in other quarters had had a similar effect. With the end of Chicago's labor troubles and the general picking up in building activities all along the line, it is believed that the time has come for the heating men to get once more in line and with a brand new start set out on the road to prosperity.

Accordingly they met in parlors L38 of the Great Northern Hotel on the morning of the 10th and took the necessary steps preparatory to launching out anew. The executive committee of the Western League met and officially declared the League to be adjourned sine die. A motion then made to reorganize under the name of the Western Association of Steam and Hot Water Fitters met with unanimous approval. While the territory which will be embraced in the membership of the new association has not as yet been defined, it is understood that it will cover about the same states as that of the now defunct League.

A new constitution and by-laws was adopted and some other matters pertaining to trade protection and betterment were acted upon, but it was the general concensus of opinion that for the present the association would better confine its efforts to perfecting and strengthening its organization. Plans were made for propaganda work and district organizers were appointed to stir up interest in their respective localities and secure the establishment of new local associations and the strengthening of existing branches.

Large powers were given to the executive committee and a glance over the list of names composing it confirms the belief that the management of affairs has been left in safe and able hands. Following are the officers of the new association, the same men also making up the executive committee:

President, W. L. Kroeschell, Chicago.

First Vice-President, E. Tunstead, Minneapolis.

Second Vice-President, Chas. B. Kruse, Milwaukee.

Treasurer, Geo. Mehring, Chicago.

Secretary, E. M. Craig, Chicago.

The convention was lacking in those social features which usually relieve the hours of deliberation. This is a busy season with most of the heating men and it was necessary to crowd the entire business to come before the convention into one day so that the members might get back to their homes without losing too much time. It required an evening session to accomplish this, but the delegates had come prepared for business and business was the order of the day from start to finish.

The following gentlemen were present and accounted for, being the duly appointed delegates from the locals represented:

ILLINOIS.

Chicago, W. L. Kroeschell, E. M. Craig, W. E. Sloane, et al; Dixon, C. P. Smith; Elmhurst, W. J. Hilliard; Jacksonville, Geo. E. Matthews; Kewanee, P. J. Kavanaugh; Mendota, S. J. Madden; Morrison, H. Sauer; Ottawa, J. M. Dougherty; Peoria, Jas. P. Nailon, Jno. O'Neill.

WISCONSIN.

Appleton, J. R. Patterson; Eau Claire, W. H. Hobbs; La Crosse, J. A. Trane; Manitowoc, J. A. Roemer; Milwaukee, C. B. Kruse, C. P. Grassler.

MINNESOTA.

Minneapolis, Jno. G. Hacey, Dan Donovan, E. Tunstead.

DAKOTA.

Fargo, W. J. Price; Grand Forks, J. B. Mooney.

The relations of the new association with the National Association of Master Fitters are expected to be most cordial and helpful. While a separate organization so far as membership is concerned, it is the desire and purpose of the association to work in perfect harmony with the parent body, the aim of both being the building up of the trade through more effective methods and the advantage of mutual assistance and protection.

New England News.

Want Eight-Hour Day.

New Haven, Conn., April 23.—The journeymen plumbers have notified the boss plumbers that they want an eight-hour day beginning May 1. The notice provides that the new conditions shall not apply to contracts taken before the receipt of the notification, but will apply to all contracts taken after that time.

The bricklayers, carpenters and painters are now working on the eight-hour schedule and the plumbers feel that they should be in the same boat. If their request is not complied with it looks as though there will be a strike.

Masters Make Proposal.

Springfield, Mass., April 22.—Seventeen of the master plumbers of this city have recently forwarded a communication to the journeymen plumbers' union, in which they make suggestions in the form of a compromise on the demand for an eight-hour day with wages the same as at present. The journeymen are now getting $3.50 for a nine-hour day, and the masters wish to compromise this by paying 40 cents an hour for the eight-hour day. Their second proposition is: "That in the future plumbers shall be paid by the hour for actual work done. Third, that should such a condition arise that they come in competition with other firms who hire men working nine hours on contract work, the local men shall be expected to meet the conditions. Fourth, that if the men are not promptly on their job and work the full time, the time will be deducted that they are absent. Fifth, that men are to furnish their own transportation to and from their work wherever that work is reached by local trolly lines. This does not apply to jobbing about this city, in which case the masters agree to furnish carfares as heretofore." The masters have called to the attention of the journeymen's union the fact that they are in direct competition with firms paying lower wages. It is the desire of the master plumbers to pay the full schedule agreed upon, but they wish the journeymen to make some provision for preventing the competition with journeymen receiving lower wages. The local union met last evening to consider this communication from the masters, but no definite action was taken. The journeymen do not look with favor upon the scheme of work by the hour and a committee was appointed last evening to confer with the masters in regard to the conditions existing and the remedies suggested. The committee is expected to report at the meeting next Monday night.

Quit Work on Hotel Job.

North Adams, Mass., April 11.—The plumbers at work on the new milk depot and on the Richmond hotel quit work today, as a result of the attitude of the unions toward Whitney Bros.

The work on these two buildings is being done by H. C. Wood & Co., a union firm. The union men claim that a small contract for grading at the milk depot was let to Whitney Bros. by Wood & Co., and consequently the union plumbers employed by Wood & Co., at both places, quit work.

O. M. Woodman, of the firm, said this afternoon that he had hired two teams from Whitney Bros. to work on the grad-

ing, but that with the exception of the two teamsters all the men at work were his own.

GO BACK TO OLD RULES.

Leominster, Mass., April 12.—According to the opinion of counsel engaged by the Leominster board of health, and the admission of members of the board of health, the new plumbing rules, which the board of health had drawn up last year, and under which the inspector of plumbing has been working and making the plumbers of Leominster live up to for the last six months, are inoperative and good for nothing, and the board of health has decided to go back to the old rules.

The new rules have been laid on the shelf, pending the result of action of the legislature on a bill, which is now before that body, which is that the same set of plumbing rules shall be adopted and used by all towns and cities in the state. At the last meeting of the board of health it was voted to go back and use the old rules and not try to enforce the new ones drawn up and adopted by the board of health in July, of last year.

It was under the new rules that the building committee of the new Lancaster street schoolhouse was forbidden to put in a certain system of closets, and which were put in, in spite of orders of the board of health.

GOOD FOR STAY-AT-HOMES.

Worcester, Mass., April 10.—Thomas Ford and Michael McNulty, Worcester journeymen plumbers, leave to-night for Niagara Falls, N. Y., to join the crew of plumbers working for Nicholas F. Deady, of Worcester, working on the Natural food conservatory and Oread buildings being built there for the Natural Food Co. Other Worcester plumbers will be sent to Niagara to work, as fast as they can be used to advantage.

Taking so many plumbers away from Worcester at this season of the year is making business good for the remaining journeymen of Worcester as, in addition to the new buildings ready to be plumbed, there will be in a few days considerable plumbing in the new saloons for which licenses will be granted by the commissioners. The regulations demand that high grade work shall be put in not only for the sewer connections from the saloon bars, but also from bar coolers, water pressure motors, pumps and supply pipes from the beer barrels in the cellars to the bar faucets.

None of the new rum lords will contract for the plumbing work until they have secured their licenses and then there will be a demand for plumbers day and night to have the work finished in a hurry. Plumbers demand double time for every hour worked after 4 o'clock in the afternoon and also for Sunday work. The average cost of plumbing for a saloon in Worcester is $250, and with 21 new saloons and several removals to be plumbed, close to $6,000 will find its way into the coffers of the plumbers.

THE NEW HAMPSHIRE PLUMBING CODE.

Concord, N. H., April 7.—(From a Staff Correspondent.)—Following is the text of the amendment to the plumbing code recently approved by the state legislature:

An act in amendment of chapter 55, of the Session Laws of 1899, relative to the examination of plumbers and the regulation of plumbing and house drainage.

Be it enacted by the senate and house of representatives in general court convened:

Section 1. That section 1 of chapter 55 of the Session Laws of 1899 is hereby amended by inserting after the word "city" in the second line of the first section thereof the words "or town," and striking out in the said second line and in the third line thereof the words "or in such towns" so that the same shall read as follows:

"Section 1. No person, firm or corporation engaged in or working at the business of plumbing in any city or town in this state as shall by vote adopt the provisions of this chapter shall hereafter engage in or work at said business in this state, either as a master or employing plumber, or as a journeyman plumber, unless such person or persons shall first obtain license or certificate so to do, in accordance with the provisions of this act."

Sec. 2. That section 3 of said act is hereby amended by striking out the word "every," in the first line and inserting in lieu thereof the words "any such" before the word "city"; by inserting the words "or towns," after the said word "city"; by striking out the words "any such towns as above provided" in first and second lines and inserting in lieu thereof the words "which shall by vote adopt the provisions of this chapter as aforesaid"; by striking out the word "shall" in the said second line and inserting in lieu thereof the word "may" before the words "by ordinance"; and by striking out in the second and third lines the words "within six months from the passage of this act" so that said section shall read as follows:

"Sec. 3. Any such city or town in this state which shall by vote adopt the provisions of this chapter, may by ordinance or by-law prescribe rules and regulations for the materials, construction, alteration, and inspection of all plumbing, house drainage, and sewer connections, creating a board for the examination of plumbers, fixing the length of term each member shall serve, and providing for an inspector of plumbing. Said board shall be appointed by the mayor or board of selectmen, and shall consist of the following three persons: A member of the local board of health, the city or town engineer, or, in the absence of such officer, a local physician in regular practice, and a journeyman plumber of not less than five years' active and continuous practical experience."

Sec. 3. That section 4 of said act is hereby amended by striking out the word "herein" and inserting in lieu thereof the word "when," and by inserting after the word "created" the words "as aforesaid" so that said section when amended shall read as follows:

Sec. 4. The examining board when created as aforesaid shall examine and pass upon all applicants, whether as masters or employing plumbers, or journeyman plumbers, in their respective cities or towns, and also all persons who may apply for the office of plumbing inspector. They shall issue a license to such persons only as shall successfully pass the required written and practical examination; and they shall register in a book kept for that purpose the names and places of business of all persons to whom a plumber's license has been granted. They shall not issue a license for more than one year, but the same shall be renewed from year to year upon proper application and upon the payment of a fee of fifty cents. Said examining board shall serve without compensation. Each applicant for examination for a plumber's license or certificate shall pay the sum of one dollar, and all moneys so collected shall be paid into the treasury of the city or town where such application is made. The license or certificate provided for by this act shall be non-transferable: and said application and examination shall not be required of the same person more than once in the same city or town. Said license or certificate shall be valid throughout the state."

Sec. 4. This act shall take effect on its passage.

E. A. CREEVEY TO BE CONSUL.

Bridgeport, Conn., April 4.—Edward A. Creevey, who conducts a stove store and plumbing business at 1211 Main street, and resides at 41 Pleasant place, will receive the appointment of United States consul at Glauchau, province of Saxony, Germany, according to a Washington dispatch.

While the President has decided to make the appointment it is understood that Mr. Creevey will not receive it until some time in May. He will close out his business here and spend a month in Washington learning the duties of a consul. He will begin his official career on July 1.

Mr. Creevey was seen this morning but he did not care to discuss the matter until the appointment had actually been received. He has been a prominent Republican worker for many years, being chairman of his district. He has also served in the common council, on the board of health and on the board of building commissioners. He belongs to the Republican club and is president of the Camp Woodbine Association, which is composed of active Republicans.

News from Pennsylvania.

WEBB-BAIRD NUPTIALS.

Pittsburg, Pa., April 23.—(From a Staff Correspondent.)—Mr. Samuel E. Baird, of the Bailey-Farrell Manufacturing Co., Pittsburg, and Miss Mary Webb were married on Tuesday evening, April 16.

SEWER TRUST ABSORBS RIVALS.

The United States Clay Manufacturing Co. sold its sewer pipe plants yesterday to the American Sewer Pipe Co. for a sum approximating $500,000. The selling company reserves its fire-proofing plants, which it is said will be later absorbed by the National Fire Proofing Co. The United States Clay Co. was the strongest competitor of the clay combine, and its purchase makes the control of the sewer pipe market possible to the American Sewer Pipe Co.

CLOSED DEAL FOR WATER WORKS.

The deal on the purchase of a controlling interest in the Uniontown Water Co. was closed at Watertown, April 19. W. J. Hays & Son, of Cleveland, O., who represent also several Pittsburg and eastern capitalists, bought 569 of the 1,000 shares of the capital stock, paying $450 a share, or 800 per cent premium, par value being $50. The remaining 431 shares are held by Hon. W. H. Playford, Mrs. L. T. Niccolls and Mrs. Dr. J. T. Shepler, who refused to sell. The purchasers will increase the mountain reservoir capacity and make other extensive improvements.

MAY DIE FROM CIGARETTES.

Frank Parks, aged 19 years, who was formerly employed by the Stickrath Plumbing Co. at McKeesport, has been removed to his home at Greensburg, in a critical condition. His illness is said to be due to the excessive use of cigarettes. A few days ago his left side became paralyzed, and in order to save his life an

operation was performed. It is feared he may not recover. Parks was in the habit of smoking many cigarettes and his friends think they are the cause of his affliction.

A High Class Firm.

Norristown, Pa., April 24.—(From a Staff Correspondent.)—Cowden & Zimmerman, one of the wealthiest firms of plumbers in Pennsylvania and owners of a large amount of property in this city, have just completed the plumbing for the new $100,000 high school building, as well as that of the infirmary building, the cost of which was $25,000. They have been in business since 1869, and report a good business and most excellent outlook for a continuation of same.

Prospect Looks Bright.

West Chester, Pa., April 22.—(From a Staff Correspondent.)—While the spring trade has not opened out as yet owing to the continued cold weather plumbers in this region are reasonably busy and the impression prevails that this is going to be a good year, particularly for steam and hot water heating. The Apple Plumbing & Heating Co. have recently completed a large heating contract, using the Bromell vapor system. As this was the first one installed in West Chester it attracted a great deal of attention. It is said to work to perfection and Mr. Charles Walker, a prominent builder under whose supervision it was installed, intends to use it in all the better class of houses which he will build during the coming season.

Killed by Cars.

Monaca, Pa., April 6, 1901.—The mangled remains of Herbert W. Holt, whose home is supposed to be at Cleveland, O., were found lying on the tracks of the Pittsburg & Lake Erie Railroad at Monaca this morning. Holt had been working for a local plumber for a few weeks, but nothing is known as to his relatives.

New Plumbing Rule.

Altoona, Pa., April 2.—At a meeting of the board of health last evening the following plumbing rule was adopted: "Rule 3. That portion of the house drain pipe within four feet of the outside of the foundation walls, or under the building, shall be constructed of cast iron pipe with joints caulked with lead; wrought iron pipe with screwed joints, or vitrified terra cotta drain pipe with solid foundation under each joint and joints carefully cemented under and around the pipes. In case of iron pipe it must be protected from rust."

For School Heating Plant.

Philadelphia, a., April 3.—On the motion of Mr. Oughton a resolution was adopted by the Committee on Property of the Board of Education yesterday recommending that councils be requested to appropriate $7,500 for the installation of a heating and ventilating plant in the Rudolph S. Walton school house, Twenty-eighth section. The structure will be completed before the reopening of the schools in September. The schools in the section are among the most overcrowded in the city, and it is imperatively necessary that the building be made ready for occupancy at the earliest possible moment.

Mayor, Plumber and Partners.

Meadville, Pa., April 4.—To-day will witness an important change in the proprietorship of the plumbing, gas and steam fitting concern of L. L. Lord, Mr. Lord taking into partnership two of his veteran employes—Chas. H. Yonts and Jacob C. Marhoefer. Mr. Yonts has been with the house 15 years, and for a long time as bookkeeper and general manager of the store, while Mr. Marhoefer's employment covers a period of 13 years, largely as foreman.

The new members of the firm add materially to the capital, and will continue in their old relation to the work and business. It is altogether likely, however, that the concern will be materially enlarged, probably adding tinning and furnace work. The firm will continue for the present at the old stand, on Market street.

This important change in his business may be noted as in celebration of Mr. Lord's inauguration to-day as mayor of Meadville, although it has been in contemplation for some time. The new members of the firm are almost as well known as Mr. Lord, and the trio will constitute about as capable and hustling a firm as could be found either in or out of Pennsylvania. The new firm will be known as the L. L. Lord Company.

The New Jobbing Firm.

Philadelphia, Pa., April 18.—(From a Staff Correspondent.)—Bridgeman Bros., who started in as jobbers in steam, water and gas goods the first of the year, report business of the first three months of their existence as far beyond anticipation. They are the Philadelphia agents for the Mackay hot water valve, manufactured by the Ohio Brass & Iron Mfg. Co., Cleveland, which is meeting with success.

Radcliff Steam Trap.

Walls & Pearsall, the hustling jobbers of this city, have been appointed sole agents for Philadelphia and vicinity for the Radcliffe Steam Trap, manufactured by the Ohio Brass & Iron Mfg. Co., Cleveland. They report heavy sales for these goods, which are of standard quality and give universal satisfaction.

Jobbers Happy.

The consensus of opinion among the leading jobbing firms of this city is that the year will be a record breaker unless unforeseen dangers arise. They quite generally report collections good, show a healthy condition among the plumbers of the Keystone state. The trade in country towns is very good and fast increasing.

Southern Notes.

A Few Fine Jobs.

Wilmington, Del., April 23.—(From a Staff Correspondent.)—Wm. H. Heine, one of our progressive plumbers, is not only doing a large out-of-town business but has several large jobs on hand. He is fitting up the power plant of the New Castle county work house; also the plumbing, drainage piping, etc., in the large morocco factories of Richard Patzowskey, of Wilmington, and is building Russian and Turkish baths for Philadelphia capitalists.

Recommend Its Adoption.

Louisville, Ky., April 16.—The sanitary plumbing ordinance came up for consideration Friday afternoon before the councilmanic committees on labor and statistics, health and gas and water. Councilman C. E. Shepard presided.

The ordinance is a lengthy one of 67 sections. It provides for a sanitary plumbing inspector at a salary of $1,500 per annum and also gives the General Council the right to appoint as many assistant inspectors as is deemed necessary.

Committees from the master plumbers and journeymen plumbers also appeared before the joint committee in favor of the ordinance.

The committee unanimously decided to recommend the ordinance favorably.

In the Sunny South.

Columbia, S. C., April 2.—(From a Staff Correspondent.)—The Lorick & Lowrance Company, of this place, have had a very busy season, having completed many heating and plumbing jobs in and around Columbia, of which the following is a partial list: Hot water heating in the State Co.'s building; steam heating in the Granby Mills hotel; steam and hot water heating in the new city hall; plumbing in the Granby Mills hotel, the new city hall and the Olympia Mills. They have recently finished work on a sheet metal job at the Brandon Mills, Greenville, and are now engaged on the plumbing and steam heating of the new addition to the South Carolina penitentiary.

Caught in the Act.

Washington, D. C., April 20.—Charles B. Ball, inspector of plumbing, has called the attention of the engineer commissioner to what he states was a deliberate attempt on the part of a journeyman plumber to deceive an inspector of his office. Mr. Ball states that the regulations require that every 1½-inch vent pipe shall be increased to two inches below the roof. He states that such a pipe in the case referred to was run through the roof without increasing the size thereof, and that a piece of two-inch pipe was slipped over the work to make it appear as having been done properly. Mr. Ball states that the inspector discovered the fault and that there was no connection made between the two pipes.

Mr. Ball further states that the matter was called to the attention of the master plumber in charge of the work, and a letter from the master plumber is submitted. Mr. Ball states that it is his belief that a deliberate attempt was made to deceive his inspector and he suggests that a plumber who will do this ought to be dealt with by the commissioners. He asks that he be at least warned that another established attempt of the kind will be visited with the revocation of his license as a master plumber.

The master plumber referred to states that when the matter was called to his attention he ordered the work immediately changed and severely reprimanded the journeyman plumber who had done the job.

The report of the inspector of plumbing has been approved by the commissioners and in accordance therewith the master plumber complained of will be informed.

Fine Heating and Plumbing.

Baltimore, Md., Apr. 9.—(From a Staff Correspondent.)—The William Groscup Co., the progressive heating and plumbing engineers, have secured the contract for heating by direct and indirect hot water system the fine residence of Dr. H. M. Carter, to be erected at the corner of Twenty-ninth and Calvert streets, price $1,050. They will also do the fine sanitary plumbing for Israel Griffith, the builder, using the best and most up-to-date fixtures, and likewise the gas fitting, contract price $935.

Busy in the South.

Augusta, Ga., April 2.—(From a Staff Correspondent.)—E. J. Erbelding tells your correspondent that he has contracts on hand as follows: Georgia Railroad Bank Building, heating by steam and plumbing, complete; new Leonard Building, a five-story building, steam heating and plumbing complete; new armory, plumbing; Murphy Block, plumbing.

GREAT THINGS EXPECTED.

Memphis, Tenn., April 23.—City Plumbing Inspector John W. Hopkins is expecting great things to happen as a result of the new plumbing ordinance which passed its first reading before the legislative council on Saturday night. While on a trip east in search for information Mr. Hopkins secured copies of the plumbing laws in use in the Eastern cities and from these he has compiled the ordinance which has been offered to the council. It will facilitate the growing plumbing interests of the city and will establish an easier system for all concerned. There is no opposition to the new ordinance so far as it has been approved by plumbers of the city, and it will probably become a law at the next meeting of the council.

THE HENDERSON PLUMBING CO.

Henderson, Ky., April 2.—The stock of plumbing, gas fitting and heating goods of A. H. Unverzagt & Bro. was purchased by L. C. Klee and M. G. Seifritz yesterday and will be hereafter conducted by them under the firm name of The Henderson Plumbing Company, with a complete line of new and up-to-date goods.

Mr. L. C. Klee several years ago conducted the above business successfully and was the leading plumber in the city, and needs no recommendation from us, as all his old patrons well know. He will have associated with him Mr. M. G. Seifritz, who has been connected with the firm of A. H. Unverzagt & Bro. for several years, and is thoroughly familiar with the plumbing and heating business in all its branches.

In connection with the regular line of goods handled they are going to fully equip themselves with machinery for cutting and threading large pipe, and special attention will be given to hot water heating and steam fitting.

Middle States.

IN A NEW LOCATION.

Jackson, Mich., April 23.—Jerry Mahoney, plumber, for a number of years located at corner of Main and Mechanic streets, has moved his shop and office to 149 West Pearl street. The store has been fitted up entire for Mr. Mahoney, and with increased facilities for showing goods.

FIXTURES ARE OF THE BEST.

Fremont, O., April 23.—(From a Staff Correspondent.)—John P. White, of this city, has just completed an up-to-date plumbing system in a fine residence built for Hon. Thomas P. Dewey, of Clyde, O., the fixtures being all of the best. He is now installing a steam heating system and the plumbing in an apartment house being built for John M. Sherman and Londonsteger, of this city.

PLENTY OF WORK.

Indianapolis, Ind., April 15.—(From a Staff Correspondent)—Clarke & Sons have the following contracts and are now working on same:

Plumbing Coburn flats, 20 bath rooms; plumbing for double residence for H. Coburn, Jr.; steam heating Arundel flats; plumbing and steam heating Kiefer building; hot water heating residence for Mr. Jno. Madden; plumbing 7 houses for L. Millikan; plumbing 9 houses for H. Dallman; addition to plumbing in police station; plumbing and gas fitting in Mrs. Mason's apartment house; steam heating Sisters of Mercy Hospital, Jeffersonville, Ind.; plumbing in High School, Salem, Ind.

PLUMBERS ARE INDIGNANT.

Elkhart, Ind., April 16.—C. H. Maloney, of the plumbing firm of Maloney & Collins, is highly disgusted over the treatment he has received at the hands of the city engineer. He states that the Prairie street sewer is laid the wrong way, but he is not responsible for that. He claims that on several occasions his men have been stopped by the engineer and it has cost him considerable money. He does not deny that the engineer warned him in this instance not to make the tap, but he claims he went to the sewer committee and was given orders to go ahead with his work. The trouble arose over a tap on the sewer at the corner of South Main and Prairie streets.

AGAIN POSTPONED.

Indianapolis, Ind., April 16.—The members of the city council who are interested in the passage of the plumbing ordinance have about concluded that they are going to have a pretty tough time of it, as a second effort to have the ordinance put through at the meeting of the council, last night, met with the same spirited and successful opposition as at the last meeting. The committee on public safety and comfort, to which the ordinance was referred at the last meeting, made a report recommending the passage of the ordinance as amended. Councilman Negley then called the ordinance up for passage, but before a vote could be taken Councilman Perrott moved that the ordinance be referred to a committee of the whole to meet next Monday night. A motion was made to table the Perrott motion, but it was lost by a vote of 8 to 8, and the Perrott motion was then carried by a vote of 10 to 6.

The chief objection urged by those who are opposed to the ordinance is that it gives the inspector almost unlimited power and makes no provision for an appeal from his decision. Councilman Billingsley, who is leading the fight against the ordinance, said, last night, that he would vote for its passage if the friends of the measure would consent to amend it so that there could be an appeal from the decision of the inspector to a board with final jurisdiction. The object in referring the ordinance to a committee of the whole, he said, was to bring about the desired amendment. Those who are in favor of passing the ordinance in its present form say that they can see no reason in providing for an appeal from the decision of the inspector, as it would do no good. "To whom would the appeal be made?" they ask. It has been suggested that the Board of Health should be made the board of appeal, but the friends of the ordinance say the Board of Health knows nothing about plumbing.

HEATING BIG BUSINESS BLOCK.

Canton, O., April 9.—(From a Staff Correspondent.)—L. B. Hartung has been awarded the contract for heating the Folwell Bros. block.

TO THE LITELT IRON WORKS.

Grand Rapids, Mich., April 8.—(From a Staff Correspondent.)—The Grand Rapids Street Railway Company has awarded to the Adolph Litelt Iron Works the contract for piping their new power house.

SOME CLEVELAND CONTRACTS.

Cleveland, O., April 3.—(From a Staff Correspondent.)—Warden & Lees are plumbing an apartment house for the Jas. Rochford Realty Co.; also a twenty-five suit apartment house for the Hazard Realty Co.

B. F. McMann & Co. are plumbing a thirty-six suit flat for the L. W. Kenzie Realty Co.

W. A. Ackerman is doing the plumbing in two flats for the Cleveland Improvement Co.

ALL MODERN FIXTURES.

Traverse City, Mich., April 8.—Arms & Cole have been awarded the contract for the heating, plumbing, ventilating and gas piping of Dr. Garner's new residence. The heating will be hot water. The boiler to be used is to be a portable double return steel boiler made by the Des Moines Manufacturing Company. The whole job will be put in according to all the latest and approved designs in the plumber's art and the total outlay for the work will be about $900.

UNDERSTANDS HIS WORK.

Shelbyville, Ind.—The Shelbyville Republican has this to say about Mr. C. C. Shipp, the plumber and gas fitter. "He not only understands his work, but when he does a job of work he is sure before he leaves it that it is done in a manner that should the party he is doing the work for ever want another job in his line, he is sure to call upon him to do the work. He has just finished putting in a bathroom for Mrs. Mary DePrez, at her home on West Broadway, and that lady pronounces the work complete and first-class in every respect. This is the third job of the kind Mr. Shipp has done for Mrs. De Prez."

TAKE A FIRM STAND.

Terre Haute, Ind., April 9.—(From a Staff Correspondent.)—The Master Plumbers' Association of Terre Haute has notified all the contractors of the city in writing that they will hereafter give no more bids to contractors or architects. In the future they will make their bids directly to the owner or to the owner's legal agent. And furthermore, no plumbers will give an agent a bid unless this agent is looking after the owner's property, collecting rents, etc., so that in no case can the owner appoint an agent for the occasion. Nor can a plumber construe any one to be an agent unless serving as above stated.

LIVERPOOL MASTERS ORGANIZE.

Liverpool, O., April 4.—Tuesday evening the master plumbers of East Liverpool held a meeting in the rooms of the Builders' Exchange, at which time the new scale of the journeymen plumbers was received. The scale is composed of seventeen sections, and after being read was discussed at length.

There was much objection to a part of the new scale.

After the discussion of the scale the master plumbers then formed an organization, which is for the present temporary. Thomas Nagle was elected president, and John Porter secretary. A committee composed of four members of the organization was appointed, and a notice was sent to the journeymen plumbers asking that a committee of four be appointed from that union to confer with the master plumbers, by which some agreeable arrangement could be made. It is supposed that a conference of the two committees will be held early next week.

It is evident that a permanent organization will be formed among the master plumbers as soon as the new scale is signed. There has not been an organization of this kind in East Liverpool.

A VETERAN IN THE TRADE.

Fort Wayne, Ind., April 8.—On April 18 A. Hattersley, senior member of the

firm of A. Hattersley & Sons, will celebrate the seventy-second anniversary of his birth, and on June 25 following he can observe the forty-sixth year of his residence in Fort Wayne. In September, 1856, he purchased the plumbing and gas fitting department of the business of B. W. Oakley & Son, and this marked the commencement of a business of which he has been continuously at the head up to the present time. He built and occupied the present building of the firm in 1861, and since then has taken into partnership each son, Willis, Byron E. and Alfred I., as they became of age.

To Take Effect May 1.

Cincinnati, O., April 15.—Cincinnati Journeymen Plumbers' Association No. 59 has presented a demand to the employers for the eight-hour day, to go into effect May 1, at the same wages now paid for nine hours, which is $3.50 per day.

In addition to the wage scale certain restrictions in regard to the hiring and work of apprentices are also demanded.

It is understood the contractors are willing to grant the proposed schedule as to hours and wages, but will not concede the requests for the regulation of the apprentices.

Richard Murphy has been selected by the Master Plumbers' Association as chairman of a committee to confer with the men.

Water Company Takes a Hand.

Indianapolis, Ind., April 12.—The Indianapolis Water Company has notified the plumbers that hereafter no work will be accepted unless proper traps are put in waste pipes that lead to the sewers or dry wells, and that all such services that do not comply with this condition must be changed.

Mr. Davis, of the water company, said this morning that it has but recently come to the notice of the company that such a condition of affairs had existed, and that sewer gas was being turned back in the houses of tenants, owing to the fact that plumbers had connected water pipes with dry wells and sewers without putting in traps.

Mr. Davis said that no investigation had been made concerning the matter, but the company had been informed of several cases, which was enough to warrant it in notifying the plumbers to comply with the rules of the company, that all connections with sewers and dry wells must have traps. Mr. Davis said many property owners did not know that the plumbers had not complied with this rule, and supposed their houses, which were occupied by tenants, were properly fitted by the plumbers, and that the water company felt bound to protect its customers as well as their tenants.

The Grand Rapids Code.

Grand Rapids, Mich., April 15.—Those who desire to put in new plumbing or rearrange the old now have a series of set rules to observe and numerous blanks to fill out. First, it is necessary for the plumber employed to submit to the plumbing inspector written specifications of the work to be placed. If these are approved he makes a written application for a permit. He pays for this permit 1 per cent of the cost of the proposed contract up to $100, and one-half of 1 per cent above that sum, but no fee is less than 50 cents. Then he puts in his plumbing, leaving it open for official inspection. The floors and walks must be left open, showing the work. While the pipes are so exposed to view they are filled with water, through the whole system, from roof to basement, and required to sustain a pressure of from 20 to 30 pounds to the square inch without cracking or leaking.

If the pipes stand the test the masons and carpenters may close up the openings. When the closets, sinks, bath tubs, etc., are connected the water is turned on and the final inspection certificate is signed by the plumbing inspector and the health officer.

Thirty-one permits have already been issued, the first being given to William Robertsan for a store at No. 20 Pearl street; cost, $98. The second was granted the Kent County Savings bank, $200 being the figure given. The cost of the jobs for which permits have been issued ranges from $200 to $17.

Under the new rules every plumbing system must have a main ventilating pipe opening at the roof, and all traps must be back-vented to give a circulation of fresh air. Both property owners and plumbers are taking kindly to the new system, and it is believed that excellent sanitary results will follow.

Notes from the West.

Contract Again Awarded.

Des Moines, Ia., April 7.—The board of control has awarded the contract for the plumbing at Cherokee once more. This time the award is made to Stephan Bros. of Council Bluffs. The first award was made to Wallace & McNamara of Des Moines, but this firm having given a bid of $19,500 for the work and not deeming it a sufficient price, refused to sign up the contract. The board accordingly awarded the contract to the next lowest bidder who complied with the specifications. Apparently this would have given the work to Gleason & Son of Chicago, whose bid was $22,930. It is said by the board, however, this firm did not comply with the specifications in making its bid. Accordingly, Stephan Bros., whose bid was $23,000, were awarded the contract. The board has made a few substitutions in the specifications, calling for better material, and this will increase the price of the plumbing slightly. The total will not exceed $23,500.

Terrific Gas Explosion.

South Omaha, Neb., April 1.—(From a Staff Correspondent.)—On March 27, while generating and charging a tank with hydrogen gas, George Janneret had his right hand cut off, receiving a serious scalp wound, and his right leg badly injured below the knee. Mike McCoy had a hole shot through his right foot. They had filled the retort with chemicals and put the end in a stove and were connecting it to the tank when the explosion took place. The retort was made of heavy 3-inch steam pipe with heavy cast fittings. The pipe leading to the tank was still open when the explosion took place. The explosion rent asunder the wrought pipe, wadded it up as one would a newspaper, blew the stove which was cast iron into more than a thousand pieces, which cut holes through hard pine ceiling as a rifle ball. The retort cut a hole through ceiling 12 inches square and tore a 2 by 4 off and lodged against outside sheeting. The explosion took place in W. S. Cook's city plumbing inspector's electrical shop. Mr. Cook had a very narrow escape. A piece of casting just grazed his head and cut a large picture frame in twain as a cannon ball would. The explosion was felt for two miles and broke lamp chimneys half a block distant. Explosion was caused by some foreign matter in the chemicals. Both Janneret and McCoy are getting along nicely.

Nebraska's New Plumbing Code.

Omaha, Neb., April 3.—Omaha is to have a board of plumbing inspectors, as well as a board of barber examiners, and henceforth any plumber who hopes to have a leadpipe cinch on his job must stand an examination and take out a license. The upper house of the legislature decided this yesterday when it passed the Uhl bill. The new law will go into effect in thirty days, after which date, it is supposed, the aroma of sewer gas and the aggravating drip of burst pipes will be no more in Omaha.

The bill, which is now in the hands of the governor, applies to all cities in the state having a population of more than 25,000. The boards are to comprise five members, to be appointed by the mayor, and are to consist of a chief health officer, a plumbing inspector, a master plumber and two journeyman plumbers, each to give a bond of $1,000 and to serve one, two and three years. The chief health officer and the plumbing inspector will each receive a salary of $1,500 per year, and the other members of the board $1,200 per year. In case it is found necessary to employ other inspectors, not ex-officio members of the board, they are to receive $5 a day while actually employed.

The bill provides that all persons in cities that come within its scope who desire to follow the business of plumbing must make application in writing to the board for a license and must then undergo an examination by the board as to their knowledge of the theory and practice of the craft. If they are found suitable persons to engage in plumbing, licenses will be issued to them. It will cost a master plumber $5 to get his permit, a journeyman plumber $1, and for every renewal an additional fee of 50 cents. The licenses will hold good for one year, and may be renewed without a re-examination, "unless it shall appear by affidavit before the board that the applicant is no longer competent." In that event he will have to take the examination again and abide by the consequences.

The plumbing inspector must inspect all work in process of construction, alteration or repair, and see that it conforms to the rules of sanitation, which rules must be of the board's adoption. It must also prescribe the kind and size of materials to be used and the manner in which the work shall be done. It may compel plans and specifications of contemplated plumbing to be submitted to it for approval.

The inspector is required to stop any defective plumbing work, or work not being done in accordance with the requirements of the board, and may have such defective work torn out and removed.

The maximum penalty for the violation of the act is a fine of $50 and the minimum a fine of $5. If the guilty person be a licensed plumber, he shall not be entitled to have his license renewed for a period of one year.

The board shall be appointed by the mayor within thirty days after the act takes effect, and new appointments shall be made annually.

The purpose of the measure, as stated in its introductioin, is to promote the public health, to regulate the sanitary construction of house draining and plumbing and to secure the registration of plumbers.

WANT A UNION MAN FOR INSPECTOR.

Denver, Colo., April 15.—Denver Local Union No. 3 of the United Association of Journeymen Plumbers, Gas Fitters, Steam Fitters and Steam Fitters' Helpers have passed the following resolution:

"Whereas, It has come to the notice of this association that there are about to be two plumbing inspectors appointed in the city of Denver; and,

"Whereas, It is rumored there are several applicants for these positions who are considered unfair to organized labor; and,

"Whereas, This union, comprising 90 per cent of all the plumbers in this city, and is the only body having a representation in the central labor bodies, the Denver Trades and Labor assembly and the State Federation; therefore, be it

"Resolved, That we most respectfully request the honorable mayor of the city of Denver to select his appointees from this organization."

The Great Northwest.

MUCH WORK ABOUT THE COUNTRY.

Watertown, So. Dak., Apr. 8.—(From a Staff Correspondent.)—Hess & Rau, of Watertown, have just completed the heating and ventilating system in the Brookings, S. Dak., high school, using the fan system. They are at present doing the plumbing in the New Reiss hotel at Tyler, Minn., and have just cleaned up the following work: High school, Mitchell, S. D.; High school, Woonsocket, S. D.; and the steam heating and plumbing in the First National bank, Watertown, S. D.

CELEBRATES HIS SEVENTY-FIRST BIRTHDAY.

Duluth, Minn., April 3.—(From a Staff Correspondent.)—Daniel Monroe, a veteran plumber of Duluth today celebrates his seventy-first birthday. He is a very well preserved old gentleman in spite of his many years and but for a recent accident would still be as actively engaged at his trade as ever. He was badly injured on February 6th in a street car accident, having several ribs broken and receiving other internal injuries. He is now recovering, however, and expects to be quite well and strong again.

HAS NO EQUAL.

La Crosse, Wis., April 2.—Since James A. Trane completed his vacuum system of steam heating a public interest has been greatly awakened in the invention, and scores of persons have signified their intention of giving it a trial. B. L. Johnson, dealer in wall paper on lower Main street, was the first person to have it placed in his store. In speaking of the system this morning, Mr. Johnson said that it absolutely had no equal so far as economy was concerned, which was Mr. Trane's aim when he first conceived the idea of inventing a new system of heating. Another advantage is the fact that if one of the pipes should burst, there would be no danger of escaping steam. Mr. Johnson says that he could not be hired to substitute another steam heating system for Trane's. The advantages, he explained, were too manifold.

New Publications.

MOTT'S NEW CATALOGUE.

The J. L. Mott Iron Works, 84-90 Beekman street, New York City, have issued a new catalogue of heating goods which they will be pleased to send to the trade on application.

THE ADVENTURES OF A TRAVELER.

The Boynton Furnace Co., 147-149 Lake street, Chicago, are responsible for a little book of verse telling of the wonderful adventures of a traveler who covered the world introducing their famous Boynton ranges. It is aptly illustrated.

READY IN THIRTY DAYS.

The L. M. Rumsey Mfg. Co., of St. Louis, Mo., write us that they are now having published a large and handsome catalogue of plumbing and steam goods which will be ready for distribution in about a month. It would be the part of wisdom to write for it in advance and make sure of getting one before the rush is on.

ANOTHER NEW CATALOGUE.

The New York Blower Company, of Bucyrus, O., heating and ventilating engineers, are distributing a new catalogue that is very tastily got up. They manufacture exhausters, blowers, heaters, engines, heating, ventilating, mechanical draft and drying apparatus, dry kilns and appliances for same.

Their New York office is at 39-41 Cortlandt street, and their Boston office is at 135 Summer street.

TASTY CATALOGUE.

The Boynton Furnace Co. have a new catalogue that is as nice a one as has reached our desk. It contains illustrations of all of their well known heaters and furnaces, with a brief description of each. In it the "Niagara" tank heater, which is winning friends everywhere, is illustrated. Two new sizes of the "Admiral" steam boiler are also given space. They are larger sizes, having 27-inch grates. A postal card will get you the new catalogue.

CAREER AND CHARACTER OF ABRAHAM LINCOLN.

An address by Joseph Choate, Ambassador to Great Britain, on the career and character of Abraham Lincoln—his early life—his early struggles with the world—his character as developed in the later years of his life and his administration, which placed his name so high on the world's roll of honor and fame, has been published by the Chicago, Milwaukee & St. Paul Railway and may be had by sending six (6) cents in postage to F. A. Miller, General Passenger Agent, Chicago, Ill. 5-11

MUNICIPAL PUBLIC WORKS.

Ernest McCullough, C. E., of Lewiston, Idaho, late consulting engineer to the Merchants Association of San Francisco, has written a hundred and fifty page book on various problems met with in city engineering, which will prove useful to boards of public works and others who are called upon to do or supervise city work. The chapter on drainage and sewerage will be found to be especially interesting and valuable to plumbers who do this class of work. The book sells for fifty cents and may be obtained of the author or of any of the leading dealers in technical works.

THE EARTH AT A GLANCE.

The International Globe Co., Room 415 Continental Bank Building, Chicago, publish what they call a "flat globe," showing the national and political divisions of the world and designed to give a correct and lasting impression of the earth, its inhabitants, various products, etc. It is circular in form, 28 inches in diameter, and printed on material of great durability and strength, and made to hang from the ceiling, chandelier or against the wall. Accompanying the globe is a geographical manual which gives a brief statistical history with suggestions for the uses of this twentieth century globe. We understand that the price of the two is but $2.00, a sum quite out of proportion to their usefulness to anyone who is at all interested in the geography and history of this great world of ours.

A HANDSOME CATALOGUE.

One of the handsomest catalogues we have received this year is an illustrated catalogue of Bundy boilers and radiators, which are manufactured by the A. A. Griffing Iron Co., with offices at 66 and 68 Centre street, New York; 177 and 179 Fort Hill square, Boston; 382 Bourse building, Philadelphia, and 449-459 Jersey City.

The catalogue, which can be had for the asking, gives complete information on everything pertaining to the Bundy line of heaters.

The Bundy sectional tubular cast iron boilers are strictly modern. Being of sectional form they are very easy to handle. They are also safe and durable. The tubes are but two inches wide, consequently the heat is never further than one inch from the water backed iron, which argues much in favor of fuel economy, the company claims, and should be considered while comparing prices.

Rocking and dumping grates of the best type are used. All duplicate parts are made precisely alike and will go together easily.

The fact that the most skilled mechanics and perfect machinery are responsible for the workmanship is given prominence. Every boiler is thoroughly tested and inspected, making it practically impossible for one to leave the factory in bad order.

Bundy boilers are made in all sizes and for all purposes. In the Bundy La Flora boiler the water is divided into thin sheets, as are also the hot gases, making it a very quick steamer.

The Bundy La Villa is designed for heating buildings of smaller size, and is made with or without ornamental sides and base plate. When the boiler is placed in a living room the ornamental pattern makes it no more objectionable than a parlor stove.

The Bundy Daisy is designed chiefly for heating water in a tank. The Bundy Jewel is made to meet the demand for a round grate boiler.

The company also makes all styles of radiators. And they too, are Bundy quality.

GOOD WORK ON THE COAST.

Seattle, Wash., April 4.—(From a Staff Correspondent.)—The D. B. Spellman Co. 215 Columbia street, have just completed the Lincoln flats, a stone and brick block, one of the finest west of New York, containing four hundred plumbing fixtures, all first class. The block is seven stories from bottom to top. It was built by Mr. James A. Moore, and certainly gives great credit to him. Mr. Moore is one of the largest real-estate owners in the northwest, and has spent several hundred thousand dollars in improvements in Seattle. The creditable part of his improvement is that he pays particular care in having first class sanitary plumbing in all his blocks.

The same company has recently completed the Smith building for the Clise Investment Co. Mr. J. W. Clise is manager of the company, and like Mr. Moore, is one of the largest capitalists in the northwest. His improvements are all substantial, and he also is a great admirer of first class sanitary plumbing. He will not have poor or shoddy work done. Those two men have made vast improvements in Seattle, and with such men as these Seattle will hold her own everywhere. Their word is as good as a banknote.

Greater New York

Office: 89-91 Centre Street Tel. Franklin 1680

ELMER CRAWFORD, Manager. Frank P. Turner, Edwin L. McCulloch } Representatives

Manhattan and the Bronx.

MR. WILCKES' SPECIALTIES.

High grade lamp blacks, carbon gas blocks and American, German and East India plumbago are specialties of Joseph Wilckes, 51 Cliff street.

WORKING ON CATALOGUE.

The E. S. Wheeler & Co., plumbers' supplies, 12 Cliff street, are working on a new catalogue. They expect to have it completed in four or five weeks.

MR. PECK IS IN CHARGE.

Charles M. Peck, formerly of Peck Bros. & Co., New Haven, Conn., is now in charge of the New York branch of the Randolph-Clowes Co., Waterbury, Conn.

GOUBERT COMPANY MOVES.

The Goubert Manufacturing Co., formerly at 14 Church street, is now at 85 Liberty street. Its new offices are more convenient than were the offices on Church street.

FREE! FREE! FREE!

A nice desk pad for memoranda is a useful article to have around. Mention Domestic Engineering in a few lines to the Randolph-Clowes Company, Waterbury, Conn., and you will get one by return mail.

SOMETHING GOOD IN PIPE HANGERS.

If you are anxious to learn something good about pipe hangers—good pipe hangers—mention "Domestic Engineering" in a few lines to Fee & Mason, manufacturers of plumbers' specialties, at 68 Beekman street.

LOOK OUT FOR MR. SAUER.

F. H. Sauer, of the Harlem Manufacturing Co., 42 West 67th street, is making a thorough canvass of all New Yorkers interested or liable to be interested in high-grade engineering specialties. Look out for him.

THE WEATHER AND BUSINESS.

The good weather of the past week has caused business to take a spurt, says Joseph Miller. Mr. Miller's shop, at 473 Fourth avenue, has a prosperous look. A visit there will convince any one that Mr. Miller is getting his share of business.

SHAFTER'S ACETYLENE BURNERS.

William S. Nichols, 253 Broadway, is now handling the Shafter acetylene burner. This burner is manufactured in different sizes and styles. It is, it is claimed, one of the best makes on the market and always gives satisfaction. It is attractive in style and finish.

SELF-HEATING TOOLS.

The Auto-Tool Manufacturing Co., 123 East Twenty-third street, is placing something new on the market in the shape of their Vulcan self-heating combination soldering and brazing tools. Much is claimed for these tools and they will no doubt find a ready sale.

MOTLEY COMPANY IS SETTLED.

The Thornton N. Motley Company, formerly at 43 John street, is now settled in its new quarters, sixth floor of the Anderson building, 12-16 John street. It has leased the building at 8 Gold street, to be used for a storehouse and shipping department.

BUSINESS VERY GOOD.

Jackson & Griffin said this week that business, while there is room for improvement, is very good. They have a number of contracts on hand and, now that the weather is opening up, are expecting many more. The weather the past month has been against business. But all lines are opening up now.

MR. SCHWAB, OF SIXTH AVENUE.

C. L. Schwab, 621 Sixth avenue, has succeeded the old plumbing firm of George E. Pasco & Co. He is working a shopful of men, but still is unable to keep up with his work. Mr. Schwab makes a specialty of repairing defective flues. He is thoroughly experienced in this kind of work and is increasing his facilities for doing this kind of work.

BUSY THESE DAYS.

N. Y. Jack & Co., the Lexington avenue plumbers, are busy these days. They are working on the 19th ward bank building and in the New York Central R. R. Y. M. C. A. The former is at 57th street and 3rd avenue and the last named at 150th street and Spencer place. They have just finished work on the new Moser studio building, 41 West 24th street, which is a handsome eight-story affair.

"A LITTLE RED BOOK."

All interested in water, gas and steamfitters' tools and machines for cutting and threading pipe will do well to get "a little red book." This little book contains illustrations and descriptions of all sizes and styles of such machines and tools.

A line to the Armstrong Manufacturing Company, Bridgeport, Conn., or 139 Centre street, New York City, will bring one to you.

DEMAND FOR CARBIDE IS GREATER.

The Electro Lamp Company, 45 Broadway, says that the demand from different parts of the country for carbide is daily becoming greater. Even the most remote parts of the country are becoming acquainted with its use.

This company is placing large quantities of its electrolite carbide. This brand is put up in ten-pound cans and can be had from any Electro Lamp Company agent.

POCKET SIZE CATALOGUES.

H. H. Beals, steam brass goods, etc., 51 Cliff street, has received a large supply of catalogues of brass goods made by the William Powell Company, Cincinnati. These catalogues are of pocket size and Mr. Beals will be glad to mail one to any one interested in steam brass goods. This is the third edition of the little book and contains illustrations and descriptions of many lubricators, oil-cups, etc., of special interest to users of gas engines and dynamos.

A WORD ABOUT CLOTH.

If you are interested in wire-cloth a line to Howard & Morse, 45 Fulton street, New York, will quickly bring you their catalogue, just out, which will tell you all you want to know about wire-cloth. They manufacture wire-cloth for bank and office railing, grills, markets, etc.; also screening reels, ornamental iron fencing and gates. They also manufacture the Blackman power ventilator wheel, mechanical ventilating appliances and the high speed Solano steam engines.

MOVED AFTER TWENTY-SEVEN YEARS.

Joshua Horrock, who for 27 years occupied a store at 45 Cliff street with his line of spark guards and other wire goods, is now at 55 Fulton street, corner of Cliff street. His factory is at 35-41 Schenectady avenue, Brooklyn, where he has recently installed some newly-improved machinery for the manufacture of wire goods and artistic metal work.

Mr. Horrock has a well-lighted office and salesroom at 55 Fulton street, which will allow him to show his goods to much better advantage than he was able to do in his former quarters.

PURE WATER NECESSARY TO HEALTH.

Pure water is an absolute necessity if we desire good health, physicians claim. The next thing to do is to get pure water. The Loomis-Manning Filter Co., 27 Church street, claims that its system—the Loomis system—of filtration will absolutely purify water.

This company is now issuing a pamphlet of its filters which explains the Loomis system of filtration. The book also contains testimonials from prominent persons and the names of users of the Loomis system in New York, Philadelphia, Washington and other cities.

FRIENDS WITH A LONG MEMORY.

"One thing the Pan-American movement has done," says a Buffalo paper, "it has persuaded Buffalonians that they have not been forgotten by outside relatives and friends." In the same way letters received by T. W. Lee, General Passenger Agent of the Lackawanna Railroad, asking for information about the Exposition, seems to show that the traveling public has not forgotten the Lackawanna as the shortest and most picturesque route to the grounds. Five through trains daily between Buffalo and New York, equipped with Pullman drawing room, sleeping and observation cars, magnificent dining cars and vestibuled coaches.

WILL BE AT 48 CLIFF STREET.

Henry Stein, Eastern agent for the Milwaukee Brass Co., calls our attention to the fact that in mentioning his intended change of address in our weekly edition of April, a mistake of the printer made his new address appear as 488 Cliff street, whereas it should have read 48. After May 1st Mr. Stein will be found at 48 with a full line of the brass goods manufactured by the Milwaukee Brass Mfg. Co.—a line of goods which are recognized even in the East as of strictly high grade. The new catalogue of these goods, now in the course of compilation, will be a valuable reference book in all things pertaining to high grade plumbers' brass goods.

LOTS OF BUSINESS.

We learn that L. O. Koven & Brother are very busy in the department of their works in which they make large hot water tanks provided with seamless drawn tinned copper tube coils for heating water by steam. They have many orders for these goods which are to be used both in this and foreign countries. These goods are all of a very high class, the materials as well as workmanship on them being of the best throughout. Mr. L. O. Koven states that their equipment for doing work of this character is the most perfect in existence at the present time and they are therefore able to produce these goods at a low cost. They should be applied to for quotations.

SCORES A HIT.

The Montauk Multiphase Cable Co., of 100 Broadway, N. Y., has scored a great hit through a resolution recently passed

by the New York board of fire underwriters. The resolution is as follows: "Resolved, That this board approves of the fire detecting wire hereafter described, as a fire alarm device for use in dwelling houses and other buildings in which it can be substituted for bell wires, and also by judicious distribution and arrangement in elevator and dumb-waiter shafts, coal and wood cellars, closets, store rooms and other unoccupied rooms, so as to give timely warning of fire and thus contribute to the greater safety of human life." The resolution refers to the fire detecting wire of the Montauk Co.

Improved Force Pump.

McCall & Sheer, 101 Beekman street, have a new force pump which they claim is the "King Bee" in that line. It is something new. There is an air passage in the handle, which extends down into the rubber cup. A small valve in the cup opens when the cup is pressed against any hard substance, and this is the whole secret of its success. At a trial test, Mr. McCall says, a dead weight of twenty-five pounds was lifted several inches from the floor. Many hotels have found this pump just what they want. Another of McCall & Sheer's specialties is a fuller ball, which is made of a graphite composition. It is guaranteed to hold its shape in hot water. Samples can be had for the asking. Mention "Domestic Engineering."

Just a Year Old.

The firm of Phelps Brothers, manufacturers' agents, 284 Pearl street, is just a year old. However, for a year-old infant it is pretty big and if it grows as much in the year to come as it did during the past year, it will be much larger and stronger than many of its competitors, who are many years older. The members of the firm say that they are in business to do business and that they are going to do their full share and some other firm's share, too, if they can.

Phelps Brothers are the New York agents of the Norristown Covering Co., which is working on a new catalogue. It is expected to have the book out within three weeks. A line to Phelps Brothers will bring you one as soon as they are received from the printer.

"Something About Coverings."

If you want to know "Something About Coverings"—something good—mention "Domestic Engineering" in a card to the H. W. Johns Manufacturing Co. asking for their booklet. They will tell you more in a minute about asbestos coverings for boilers, pipes, etc., than some people could tell you in a year. Their New York address is 100 William street. They also have offices in Boston, Philadelphia, Pittsburg, Cleveland, Cincinnati, Columbus, Chicago and London.

The H. W. Johns Co. have devoted over forty years to learning "Something About Coverings." That the something they learned is something good is shown by the tremendous output of their factories and the large force of skilled mechanics they employ to get out contracts in all parts of the United States.

Mr. A. H. Shafer, a prominent plumber of San Antonio, Texas, and his interesting family.

What Mr. Bell Says.

"We are busier now than we ever were," said Mr. Bell, of the E. C. Bell Manufacturing Co., this week. "We are getting orders from all over. Business is much better with us now than it was at this time last year, though we were busy then, too. Our factory is running night and day, with as many men as we can work working on each shift. We have in right now orders enough to keep us working the way we are for over three months. If we wouldn't receive another order for that length of time we wouldn't need to cut down our force for three months. But we are receiving orders right along for delivery as soon as possible. There are a few who say business is bad, but I must say that we are getting all we can handle. I don't think there will be any change in conditions, either, except for the better."

Lawler's Empire Steam Trap.

The Lawler Water Feed & Damper Regulator Co., 20 West Houston street, and 181 Mercer street, is sending out circulars of its Empire steam trap. This trap, it is claimed, has great power and capacity for its size. It is provided with by-pass and tapped for air valve, and is used for high or low pressures. All working parts can be removed without breaking pipe connections.

The Lawler Company also manufactures temperature regulators for hot water tanks, automatic water feeders for hot water and low pressure steam heating plants, automatic floatless hot water air valves, high and low pressure steam damper regulators, automatic expansion tanks, automatic cellar drainers, gas water heaters, special water fittings, etc.

When you write for circulars just mention "Domestic Engineering."

Business Will Be Better.

Richardson & Morgan Co., furnaces, 92 Beekman street, say business is better now than it was this time last year, even though the weather has held it back some. They are looking forward to 1901 being an extra good year with them. People are moving now, which is another reason why furnace trade is not rushing; but if the weather opens up soon and remains good May 15 will find every furnace dealer in New York working overtime.

More Room Needed.

Richardson & Boynton, 232 and 234 Water street, have found it necessary to have still another store room in which to show their large line of furnaces. They have leased the large store room at 236 Water street and have already taken possession. They have furnaces of all sizesa nd are always glad to show them.

Business Never Better.

Business was never better with the United Metal Manufacturing Co., 525 and 527 Broome street, than it is right now. However, this is not to be wondered at when the quality of work done by this company is taken into consideration.

The United Company had all it could do last year, working full handed, while many older companies were working

short handed and short hours. Then it increased its facilities, putting in some special machinery and taking on more men, and when the dull season came kept on working to make up on extensive stock. Now it can ship from stock on a moment's notice all sizes of straight, side, gas and electric nozzles, cast and ring key chandelier cocks, stiff joints, bushings, screws, ornaments, and any of the small turned goods regularly made by it.

Quotations on any article turned from bar metal will be sent on receipt of sample.

A Cliff Street Item.

The Simonds Furnace Co., 50 Cliff street, say business is good but that their facilities would enable them to do more easily. This company manufactures the well known Culver hot-air furnaces and kitchen ranges. It also manufactures hot-water and steam boilers and registers.

The Simonds Company succeeded the Simonds Manufacturing Co. and Culver, Simonds & Co. It has been making furnaces and ranges for over a half century and has had its salesrooms at 50 Cliff street for nearly forty years.

This company has patented a jointless upright radiator to be used, if desired, in connection with its furnaces. It is a device for increasing the power of a furnace.

The Simonds Company also manufactures a full line of heaters for school houses.

A 1901 catalogue will tell all about them.

Report A Good Business.

Evans, Almirall & Co., 44 Dey street, engineers and contractors for heating, ventilating and power plants, report business good.

They also say that their "Evans" exhaust hot water heating system is a 'good 'un."

This system is used without back-pressure. The exhaust pipe is open free to the air. The waste heat from muffles, ovens and furnaces is utilized for heating. Any number of buildings can be heated and controlled from central plant.

Among other claims for this system is that the temperature of the entire system may be varied to suit weather conditions, giving economy and comfort. If live steam must be used at times it is not mixed with the exhaust, and is returned clean to the boilers without trap or return pump, at a temperature corresponding to the pressure.

Something About Gas Supplies.

The E. P. Gleason Manufacturing Co., 20 West Houston street, and 181-183 Mercer street, is issuing catalogues for the different lines of goods it handles. The catalogue for miscellaneous gas supplies is complete, every known article in that line having a place. This company handles the Holland improved three wheel pipe cutter, which has created such a favorable impression. The Trimo pipe wrench is also illustrated. The Gleason Company is now putting on the market an improved pipe cutting and threading machine, which should be in the hands of every gas fixture dealer. The well known Stillson pipe wrench, made of Black Diamond cast steel, is also sold by this company.

If you are in any way interested in gas supplies it might be well for you to have a Gleason catalogue on hand. If you don't have use for it now you will sometime. In writing ask for catalogue M.

About Bundy Air Valves.

The A. A. Griffing Iron Co. is having large sales on its Bundy combination, automatic and positive air valves and the Bundy-Baker automatic air valves,

One of the special advantages claimed for the first named valve is that it has the double feature of being an automatic air valve as well as a positive pet cock. The air may be quickly drawn from the radiator by turning the thumb-screw of the positive vent. When this is done with a No. B valve, the air escapes into the drip pipe. With a No. C valve the air passes into the evaporation cup.

This valve is sensitive, durable, small in size, low in price, ornamental, has screw-top cap, and all parts are screw-thread connections.

The Bundy-Baker automatic air valve is no experiment. Too many are already in use to question its superiority. Many large steam fitters use it on their work, and have always found it reliable and effective. Another claim is that it is just as good after ten years' use as when first applied.

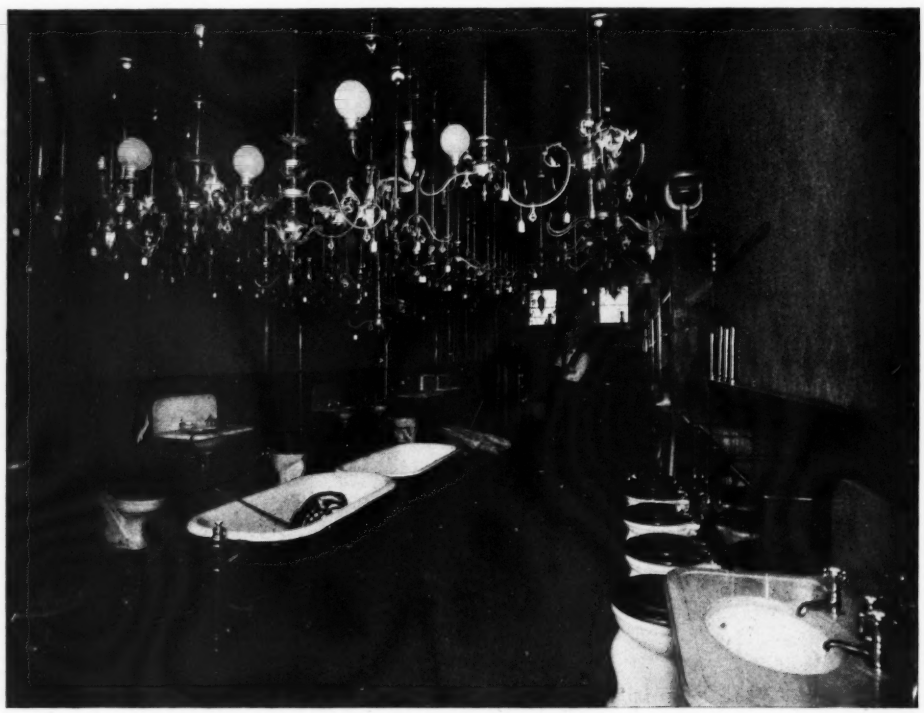
You All Want It.

There is not gainsaying the fact that thousands of readers of "Domestic Engineering" will visit the Pan-American exposition at Buffalo this summer. In order that you may be posted on the city of Buffalo, the exposition, etc., we deem it proper to publish this notice. If you contemplate going or wish to inform yourself on what is going on, drop a postal card to T. W. Lee, general passenger agent Lackawanna Railroad, 26 Exchange Place, New York City, and receive in return the handsomest guide, pictorially illustrated with five half tones of buildings, grounds, scenery, etc, yet seen. It is really a miniature work of art containing in addition to the above a map in several colors of the entire exposition grounds. This is not all. The enterprising Lackawanna railroad also publishes in the same a colored map of the eastern states. The back page contains a bridseye view of the buildings, and this novel and interesting pamphlet is yours, if you mention "Domestic Engineering."

Webster Gas Engines.

The Webster Manufacturing Company, 38 Dey street, have a neat little catalogue of their lines of gas engines, which should be in the hands of every one in need of an engine of any kind. A postal will bring it.

In these days of hustle and bustle the gas engine is making itself known. It is being used wherever power is wanted.



Fine Display made by the Akron Plumbing & Heating Co., of Arkon, O.

Confectioners use it because it is so easily operated; small machine shops and factories use it for the same reason. It is just the thing for country newspapers. In one letter in the catalogue the writer says he has a Webster, 4 H. P., mounted on a truck wagon for the purpose of sawing wood. He says it averages from forty to fifty cords per day, which is from fifteen to twenty cords more than was sawed a preceding season with a 15 H. P. traction engine to furnish the power.

The farm is another place where gas and gasoline engines are rapidly becoming known. It can be used for furnishing power for pumping water, grinding grain and doing much other work on a farm.

SENDING OUT BOOKLETS.

Charles I. Hobkirk, 42 Dey street, is sending out booklets of the E. W. Bliss Co., who manufacture the Bliss-Heath patent vacuum pumping engines.

Among the good points claimed for this engine are:

It uses steam without appreciable gauge pressure, only enough steam being required to balance pressure of atmosphere.

It can be operated in connection with an ordinary low-pressure house heating steam boiler.

It is self-oiling.

It is noiseless.

Anyone can operate it.

It is fully guaranteed.

This engine is especially designed to raise water from street mains, wells or from any other source, to elevated tanks, to furnish a never-failing supply of water for the upper stories of city buildings where the pressure is inadequate, and for country residences, etc.

The Bliss company also designs and builds a deep well pump, presses, dies, shears, drop hammers, double seamers and special machinery for all kinds of sheet metal work.

NASON COMPANY'S CATALOGUE.

The Nason Manufacturing Company, 71 Beekman street and 71 Fulton street, the large manufacturers of steam engineering specialties, etc., has just issued a catalogue for 1901. This catalogue is very complete, not a thing in the engineering and plumbing lines being overlooked.

This company has had an experience in the manufacture of various steam engineering specialties of more than half a century. It has always been their policy to fully guarantee the quality of all their goods. Any way unsatisfactory, or not as represented at time of sale, may be returned at the cost of the Nason Company.

From the very large list of materials made for steam fitters' and plumbers' use, only the best have been selected for sale. Especial attention is directed to the Nason patented specialties, including particularly the well-known Equator and Gulf-Stream heaters, which, after several seasons of severe trial under all possible conditions of service, have clearly shown their worth.

The Nason Company has a competent staff of engineers, whose long experience will willingly be placed at the disposal of anyone contemplating the installation of any kind of steam apparatus.

CUBA AFTER AMERICAN GOODS.

Cuba will quickly become Americanized if American manufacturers are allowed their way. The people of the little island know a good thing when they see it, which is probably responsible for a shipment of Rider-Ericsson hot-air engines made to Havana during the past week.

Mr. Sayre, of the Rider-Ericsson Engine Company, 22 Cortlandt street, says that his company is keeping up with the times in hot-air pumping engines. Shipments have been made during the past week to Cuba, Venezuela, Australia and India, as well as to various parts of North America.

Among other advantages claimed for this engine is that it is absolutely safe. It is practically noiseless. Any gardener or ordinary domestic, it is claimed, can operate it.

The expense for fuel is a small item. A kerosene-burning attachment can be used that when started will require no attention for hours, thus making practically an automatic pumping machine.

These engines are admirably adapted for country residences. The water can be pumped from almost any source on the premises—from well, cistern, spring, brook, lake or pond—and elevated to the highest part of a building, thus investing a country home with all the sanitary conveniences and luxuries of a city house.

A line will bring you a catalogue. Ask for one. Branch stores are at 239 and 241 Franklin street, Boston, 86 Lake street, Chicago, and 40 North 7th street, Philadelphia.

SOMETHING NEW AND GOOD.

Something new in street washers and stop cock boxes is being put on the market by the Chapman Manufacturing Co., 1710 Fulton street. With the Chapman box it is not necessary, in case the top box is broken, to open the ground to replace the broken box with a new one. There is little chance of the casting or piping bursting, as the Chapman box is provided for double contraction and expansion, top and bottom, in extreme cold or warm weather. Write for descriptive circulars.

Messrs. Nye, Zindle and Viall, of the Akron Plumbing and Heating Co.

A BUSY SHOP.

The shop of Charles Hill, 85 Flatbush avenue, was full of busy plumbers this week. In fact, Mr. Hill was too busy to talk.

MR. STOUGHTON RETICENT.

James C. Stoughton, 37 Flatbush avenue, was rather reticent about his business this week. He is, however, in business, he says, at the same old stand and is at home to all needing the services of a good plumber.

WHAT MR. CUNNINGHAM HAS DONE.

Christopher Cunningham, of the Novelty Steam Boiler Works, Greenpoint avenue and Newtown creek, has increased his force so as to enable him to manufacture a full line of hot water tanks for flat houses. The tanks are made in 6, 7 and 8 foot lengths. The regular sizes are 30 inches in diameter, made from 3-16 inch shell, with ¼ inch flat heads.

DESERVES ALL ENCOURAGEMENT.

Washington, D. C., April 20, 1901. To the Editor of "Domestic Engineering.—Dear Sir: It is with much pleasure that I join with my co-laborers in congratulating you upon the success of "Domestic Engineering."

The high standard of your paper deserves all the encouragement the trade can give it. I am sure we do not lack appreciation of American energy and gentlemanly conduct which has made your paper what it is.

May you have good health and continued prosperity, and your subscription list contain the name of every boss, journeyman and apprentice boy, and that they will be prompt payers, is the earnest wish of, yours very truly,

Ed. J. Hannan.

ANSWER.

The editor thanks Mr. Hannan most heartily for his words of cheer and encouragement. The newspaper man's life is not altogether a bed of roses, but the receipt of such a letter occasionally goes a long way toward reconciling him to his lot. We always appreciate any proof that our efforts in behalf of the plumbing fraternity are not wasted on the desert air, so do not hesitate to express your approval if you are ever moved to do so by a generous impulse. On the other hand we court honest criticism, knowing that faithful are the wounds of a friend. If you have anything to suggest whereby "Domestic Engineering" can be made of greater benefit to the craft, in the name of good plumbing let us know about it, and if you have an honest fault to find with the policy or conduct of this journal tell it to us. Specific criticism is welcomed and will receive prompt attention.

A MISTAKEN IDEA.

Flint, Mich.—To the Editor of "Domestic Engineering." Sir: I have had a problem given here by a church society on church heating. The edifice is quite large, some hundred and ninety three thousand cubic feet in auditorium and chapel. A member of the church asked the question, "Why would not the principle of railroad cars,—a return bend under the seats with radiator valve leading through floor to steam main—be adaptable to churches?" He thought it would distribute the heat more evenly.

Please give your opinion in "Open Letters" in your next monthly edition. Also what is a good proportion of cubic space to radiating surface in churches for steam heating?

ANSWER.

We cannot recommend the system of heating suggested by the church member on any ground short of absolute necessity. Its employment in railway coaches is necessitated by the peculiar conditions under which cars have to be heated and ventilated, but its points of weakness are recognized by the traveling public and are the cause of no end of trouble for the train crew. Any one who has realized the sense of general discomfort which comes of traveling in an overheated, poorly ventilated railway coach would not hesitate to condemn the system of heating out of hand. The feet and limbs sizzle while the body shivers and the teeth chatter because of the cold draft of window cracks and open doors.

The adoption of such a system for heating a church building would be a great mistake and would soon be recognized as such. The radiators should be placed at the points of greatest exposure, in the vestibule, near windows and on the sides of the building which are exposed to the outer air. If these points are warmed by radiators proportioned to the degree of exposure the rest of the building will take care of itself.

To the second question, viz., the proportion of cubic space to radiating surface in churches for steam heating, we can only give a general answer, as we do not know the conditions of the problem in this particular case. If the church has not an unusual amount of window exposure and the windows are well set and tight when closed one foot of radiation for every 175 feet of cubic space to be heated should be sufficient to keep the church comfortable in zero weather. In no case, however, should there be any guess work as to the actual amount of air to be heated. To the cubic contents of the auditorium should be added the volume of air cooled hourly by wall, door and window exposures, allowing six to eight feet for each square foot of outer wall exposure, according to the thickness and composition of the wall, and remembering that each square foot of window or door exposure will cool seventy-five cubic feet of air per hour. With these precautions the proportion we have given should prove adequate for the work.

PLUMBING ORDINANCES NOT MODERN.

St. Paul, Minn.—To the Editor of "Domestic Engineering."—Sir: During the discussion about the plumbing bill which recently passed the legislature here one of the enemies of the bill advanced the old argument that our fathers got along without any such legislation and that the whole thing was a new idea cooked up by the plumbers to better their business. Now, isn't it a fact that such laws have been in force in other countries for a great many years, and that most of the older states in our own country have plumbing laws which everybody recognizes as just and necessary to the public health? Our plumbing law was passed O. K. and you may think I'm a little late in asking for information now, but if you answer this question now you will settle a dispute and maybe help someone else who is interested in the subject.

ANSWER.

Our correspondent is right in supposing that plumbing legislation is not a modern innovation, but that, on the contrary, the necessity for some legal enactment which will prevent ignorant and unskilled persons from undertaking to do plumbing work has long been recognized both in this country and in the older countries of Europe. If he had kept track of the news columns of "Domestic Engineering" for the past few years he would have been able to answer his antagonist with the proof that the importance of this subject is being recognized more clearly every year and that in nearly every state which has not already passed some form of plumbing code the matter is being agitated not only by the plumbers but by health boards and private individuals who realize the importance of protecting the public against the dangers of botch plumbing. It is safe to say that not a week passes in which we do not see the passage of either a city ordinance or a state law governing the practice of plumbing.

Regarding the antiquity of such legislation it will suffice to give the text of a law passed in the time of Edward III., A. D., 1365. There may have been plumbing laws before this time, but this one is sufficiently old to prove the point.

38 Edward 3rd, A. D. 1365. Letter Book E. (Norman French).

May it please the honorable men and wise, the Mayor, Recorder, and Aldermen of the City of London, to grant unto the Plumbers of the said City the points that here follow:

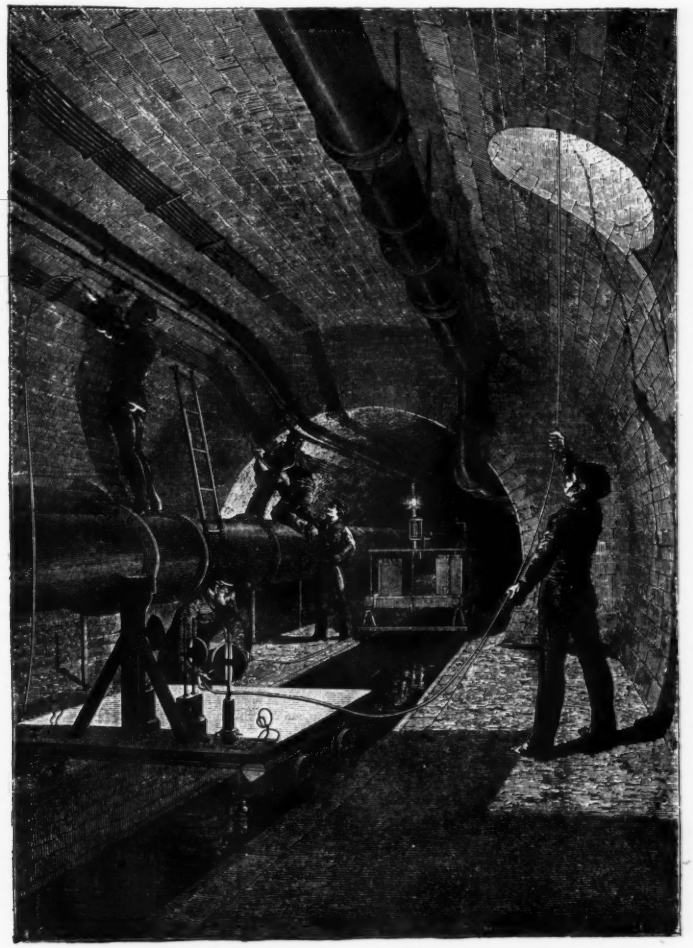
In the first place, that no one of the trade of Plumbers shall meddle with the works touching such trade within the said City, or take house or apprentice, or other workmen, in the same, if he be not free of the City; and that, by assent of the best and most skilled men in the said trade, testifying that he knows how well and lawfully to work, and to do his work; that so the trade may not be scandalised, or the commonalty damaged and deceived, by folks who do not know their trade.

Also, that no one of the said Trade shall take an apprentice for less than seven years; and that he shall have him enrolled within the first year and at the end of his term shall make him take up his freedom, acording to the usage of the said City.

Also, that every one of the Trade shall do his work well and lawfully, and shall use lawful weights, as well in selling as in buying, without any deceit or evil intent against any one; and that for working a clove of lead for gutters, or for roofs of houses, he shall only take one-half penny; and for working a clove

for furnaces, tappetroghes, belfrys, and conduit pipes, one penny; and for the waste of a wey of lead when newly molten [he shall have an allowance of two cloves], as has been the usage heretofore.

Also, that no one for singular profit shall engross lead coming to the said City for sale, to the damage of the commonalty; but that all persons of the said Trade, as well poor or rich, who may wish, shall be partners therein at their desire. And that no one, himself or by another, shall buy old lead that is on sale, or shall be, within the said City or without, to sell it again to the folks of the said trade, and enhance the price of lead, to the damage of all the commonalty.



Also, that no one of the said Trade shall buy stripped lead of the assistants to tilers, laggers, or masons, or of women who cannot find warranty for the same. And if any shall do so, himself or by his servants, or if any one of them be found stealing lead, tin, or nails, in the place where he works, he shall be ousted from the said Trade for ever, at the will and ordinance of the good folks of such Trade.

Also, that no one of said Trade shall oust another from his work undertaken or begun, or shall take away his customers or his employers to his damage, by enticement through carpenters, masons, tilers, or other persons, as he would answer for damage so inflicted, by good consideration of the masters of the Trade.

And if any one shall be found guilty under any one of the Articles aforesaid, let him pay to the Chamber of the Guildhall, in London, for the first offense 40 pence; for the second half a mark; for the third 20 shillings; and for the fourth, 10 pounds, or else forswear the Trade.

The Sewers of Paris.

Ottumwa, Ia. To the Editor of "Domestic Engineering."—Sir: I have heard a great deal about the sewer system of Paris, but do not seem to be able to find any account of them in any book I have run across. Can you tell me in what way they are remarkable and any other information you may happen to have about them. Kindly answer through the columns of your valued paper.

Answer.

The large sizes of the sewers in Paris have always been commented upon. It is quite the proper thing for visitors to examine the sewers as one of the wonders of the city. During the summer months visitors are taken weekly through the larger sewers in a cleaning boat. The system, in the extent to which it is carried out, the most wonderful in the world, was designed by the eminent engineer, Belgrand. The larger sewers, one of which is illustrated below, have a banquette on one or both sides of the invert, high enough to be above the ordinary flow, and wide enough to be walked upon. There are two classes of the larger sewers. The first class or main collectors, have an invert about 11 feet wide and 4½ feet deep, in which the cleaning boats float. The secondary class (like the one shown in the illustration) have inverts, 47¼ inches wide by 31 deep with iron rails at their edges, upon which cleaning trucks are run. All the sewers, and even the house branches, are built large enough to enable men to walk upright in them, the latter extending to the point where the vertical soil-pipe enters. These sewers are ventilated through the street gullies and the outfalls, and, occasionally, there are pipes which terminate at the house-tops. There are no objectionable odors in the sewers. The man-holes are usually from the sidewalk and enter at the side of the sewer. Most of the sewers are constructed of a coarse sandstone; some of concrete, very few of brick. There are forty-five miles of main sewers and 348 miles of branches. There are no pipe sewers. The illustration shows a group of workmen in the operation of suspending a telephone cable, and is from large pipe shown at the left of the sewer is used for conducting the water of the river Seine, which is used for watering and sprinkling purposes. The large pipe at the crown of the sewer conducts water for household purposes. The tube next in size is a portion of the pneumatic postal service. The still smaller pipe is used to transmit the air-pressure for a large system of pneumatic clocks distributed over Paris. The completed set of cables are those of the telegraph system.

A Bad Case of Boiler Scale.

Chicago, Ill.—To the Editor of "Domestic Engineering"—Sir: If you will call upon Harry Stanton, county plumber at the county building, corner of Michigan and Dearborn streets, you will have a chance to see one of the worst cases of boiler scale that has ever come to my notice. If you care to look this case up, wish you would give your opinion as to the cause of the pipes clogging up so, in the open letter department of "Domestic Enginering."

Answer.

A representative of "Domestic Engineering" called upon Mr. Stanton, as suggested, and found him to be a man who is very well posted on all matters pertaining to his trade. He willingly showed our representative sections of pipe which it had been necessary to remove from the heating system, because it was so badly clogged with sediment or scale. The section of pipe which we illustrate herewith is a fair average sample, certain portions of the pipe being comparatively clear of scale and other portions being somewhat more clogged than the piece shown. An elbow joint was so badly stopped up that a piece of copper wire quite filled the bore.

The section shown was taken from a vertical riser about 170 feet from the boiler, and had been in position not more than six or seven years. The heating system had been giving trouble for some time, and while Mr. Stanton had suspected what the trouble was, he was not prepared to find the pipe so badly fouled as it was. The pipe has been seen by a number of engineers and others, all of whom express surprise at the thickness of the deposit in a vertical pipe so far from the boiler. As to the cause, Mr. Stanton had no further explanation than that some freak of circulation had deposited the sediment as found.

As to the primary cause of the deposit it is doubtless due to the presence of a large percentage of bicarbonate of lime in the water used in the boiler. This substance is lime charged with a double

DESERVES ALL ENCOURAGEMENT.

Washington, D. C., April 20, 1901. To the Editor of "Domestic Engineering.—Dear Sir: It is with much pleasure that I join with my co-laborers in congratulating you upon the success of "Domestic Engineering."

The high standard of your paper deserves all the encouragement the trade can give it. I am sure we do not lack appreciation of American energy and gentlemanly conduct which has made your paper what it is.

May you have good health and continued prosperity, and your subscription list contain the name of every boss, journeyman and apprentice boy, and that they will be prompt payers, is the earnest wish of, yours very truly,

Ed. J. Hannan.

ANSWER.

The editor thanks Mr. Hannan most heartily for his words of cheer and encouragement. The newspaper man's life is not altogether a bed of roses, but the receipt of such a letter occasionally goes a long way toward reconciling him to his lot. We always appreciate any proof that our efforts in behalf of the plumbing fraternity are not wasted on the desert air, so do not hesitate to express your approval if you are ever moved to do so by a generous impulse. On the other hand we court honest criticism, knowing that faithful are the wounds of a friend. If you have anything to suggest whereby "Domestic Engineering" can be made of greater benefit to the craft, in the name of good plumbing let us know about it, and if you have an honest fault to find with the policy or conduct of this journal tell it to us. Specific criticism is welcomed and will receive prompt attention.

A MISTAKEN IDEA.

Flint, Mich.—To the Editor of "Domestic Engineering." Sir: I have had a problem given here by a church society on church heating. The edifice is quite large, some hundred and ninety three thousand cubic feet in auditorium and chapel. A member of the church asked the question, "Why would not the principle of railroad cars,—a return bend under the seats with radiator valve leading through floor to steam main—be adaptable to churches?" He thought it would distribute the heat more evenly.

Please give your opinion in "Open Letters" in your next monthly edition. Also what is a good proportion of cubic space to radiating surface in churches for steam heating?

ANSWER.

We cannot recommend the system of heating suggested by the church member on any ground short of absolute necessity. Its employment in railway coaches is necessitated by the peculiar conditions under which cars have to be heated and ventilated, but its points of weakness are recognized by the traveling public and are the cause of no end of trouble for the train crew. Any one who has realized the sense of general discomfort which comes of traveling in an overheated, poorly ventilated railway coach would not hesitate to condemn the system of heating out of hand. The feet and limbs sizzle while the body shivers and the teeth chatter because of the cold draft of window cracks and open doors.

The adoption of such a system for heating a church building would be a great mistake and would soon be recognized as such. The radiators should be placed at the points of greatest exposure, in the vestibule, near windows and on the sides of the building which are exposed to the outer air. If these points are warmed by radiators proportioned to the degree of exposure the rest of the building will take care of itself.

To the second question, viz., the proportion of cubic space to radiating surface in churches for steam heating, we can only give a general answer, as we do not know the conditions of the problem in this particular case. If the church has not an unusual amount of window exposure and the windows are well set and tight when closed one foot of radiation for every 175 feet of cubic space to be heated should be sufficient to keep the church comfortable in zero weather. In no case, however, should there be any guess work as to the actual amount of air to be heated. To the cubic contents of the auditorium should be added the volume of air cooled hourly by wall, door and window exposures, allowing six to eight feet for each square foot of outer wall exposure, according to the thickness and composition of the wall, and remembering that each square foot of window or door exposure will cool seventy-five cubic feet of air per hour. With these precautions the proportion we have given should prove adequate for the work.

PLUMBING ORDINANCES NOT MODERN.

St. Paul, Minn.—To the Editor of "Domestic Engineering."—Sir: During the discussion about the plumbing bill which recently passed the legislature here one of the enemies of the bill advanced the old argument that our fathers got along without any such legislation and that the whole thing was a new idea cooked up by the plumbers to better their business. Now, isn't it a fact that such laws have been in force in other countries for a great many years, and that most of the older states in our own country have plumbing laws which everybody recognizes as just and necessary to the public health? Our plumbing law was passed O. K. and you may think I'm a little late in asking for information now, but if you answer this question now you will settle a dispute and maybe help someone else who is interested in the subject.

ANSWER.

Our correspondent is right in supposing that plumbing legislation is not a modern innovation, but that, on the contrary, the necessity for some legal enactment which will prevent ignorant and unskilled persons from undertaking to do plumbing work has long been recognized both in this country and in the older countries of Europe. If he had kept track of the news columns of "Domestic Engineering" for the past few years he would have been able to answer his antagonist with the proof that the importance of this subject is being recognized more clearly every year and that in nearly every state which has not already passed some form of plumbing code the matter is being agitated not only by the plumbers but by health boards and private individuals who realize the importance of protecting the public against the dangers of botch plumbing. It is safe to say that not a week passes in which we do not see the passage of either a city ordinance or a state law governing the practice of plumbing.

Regarding the antiquity of such legislation it will suffice to give the text of a law passed in the time of Edward III., A. D., 1365. There may have been plumbing laws before this time, but this one is sufficiently old to prove the point.

38 Edward 3rd, A. D. 1365. Letter Book E. (Norman French).

May it please the honorable men and wise, the Mayor, Recorder, and Aldermen of the City of London, to grant unto the Plumbers of the said City the points that here follow:

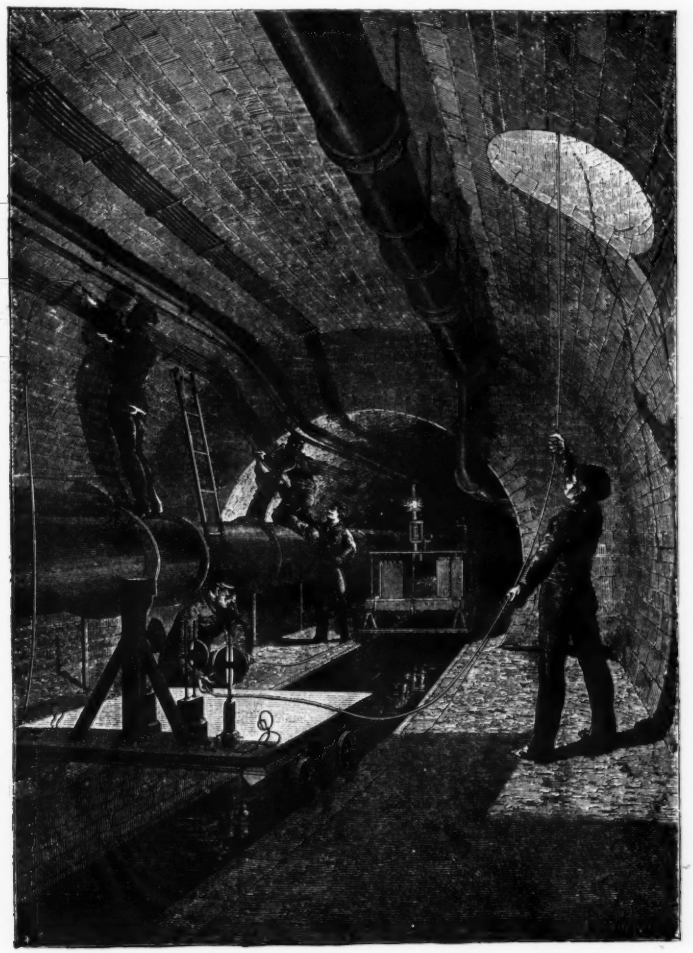
In the first place, that no one of the trade of Plumbers shall meddle with the works touching such trade within the said City, or take house or apprentice, or other workmen, in the same, if he be not free of the City; and that, by assent of the best and most skilled men in the said trade, testifying that he knows how well and lawfully to work, and to do his work; that so the trade may not be scandalised, or the commonalty damaged and deceived, by folks who do not know their trade.

Also, that no one of the said Trade shall take an apprentice for less than seven years; and that he shall have him enrolled within the first year and at the end of his term shall make him take up his freedom, acording to the usage of the said City.

Also, that every one of the Trade shall do his work well and lawfully, and shall use lawful weights, as well in selling as in buying, without any deceit or evil intent against any one; and that for working a clove of lead for gutters, or for roofs of houses, he shall only take one-half penny; and for working a clove

for furnaces, tappetroghes, belfrys, and conduit pipes, one penny; and for the waste of a wey of lead when newly molten [he shall have an allowance of two cloves], as has been the usage heretofore.

Also, that no one for singular profit shall engross lead coming to the said City for sale, to the damage of the commonalty; but that all persons of the said Trade, as well poor or rich, who may wish, shall be partners therein at their desire. And that no one, himself or by another, shall buy old lead that is on sale, or shall be, within the said City or without, to sell it again to the folks of the said trade, and enhance the price of lead, to the damage of all the commonalty.



Also, that no one of the said Trade shall buy stripped lead of the assistants to tilers, laggers, or masons, or of women who cannot find warranty for the same. And if any shall do so, himself or by his servants, or if any one of them be found stealing lead, tin, or nails, in the place where he works, he shall be ousted from the said Trade for ever, at the will and ordinance of the good folks of such Trade.

Also, that no one of said Trade shall oust another from his work undertaken or begun, or shall take away his customers or his employers to his damage, by enticement through carpenters, masons, tilers, or other persons, as he would answer for damage so inflicted, by good consideration of the masters of the Trade.

And if any one shall be found guilty under any one of the Articles aforesaid, let him pay to the Chamber of the Guildhall, in London, for the first offense 40 pence; for the second half a mark; for the third 20 shillings; and for the fourth, 10 pounds, or else forswear the Trade.

The Sewers of Paris.

Ottumwa, Ia. To the Editor of "Domestic Engineering."—Sir: I have heard a great deal about the sewer system of Paris, but do not seem to be able to find any account of them in any book I have run across. Can you tell me in what way they are remarkable and any other information you may happen to have about them. Kindly answer through the columns of your valued paper.

Answer.

The large sizes of the sewers in Paris have always been commented upon. It is quite the proper thing for visitors to examine the sewers as one of the wonders of the city. During the summer months visitors are taken weekly through the larger sewers in a cleaning boat. The system, in the extent to which it is carried out, the most wonderful in the world, was designed by the eminent engineer, Belgrand. The larger sewers, one of which is illustrated below, have a banquette on one or both sides of the invert, high enough to be above the ordinary flow, and wide enough to be walked upon. There are two classes of the larger sewers. The first class or main collectors, have an invert about 11 feet wide and 4½ feet deep, in which the cleaning boats float. The secondary class (like the one shown in the illustration) have inverts, 47¼ inches wide by 31 deep with iron rails at their edges, upon which cleaning trucks are run. All the sewers, and even the house branches, are built large enough to enable men to walk upright in them, the latter extending to the point where the vertical soil-pipe enters. These sewers are ventilated through the street gullies and the outfalls, and, occasionally, there are pipes which terminate at the house-tops. There are no objectionable odors in the sewers. The man-holes are usually from the sidewalk and enter at the side of the sewer. Most of the sewers are constructed of a coarse sandstone; some of concrete, very few of brick. There are forty-five miles of main sewers and 348 miles of branches. There are no pipe sewers. The illustration shows a group of workmen in the operation of suspending a telephone cable, and is from large pipe shown at the left of the sewer is used for conducting the water of the river Seine, which is used for watering and sprinkling purposes. The large pipe at the crown of the sewer conducts water for household purposes. The tube next in size is a portion of the pneumatic postal service. The still smaller pipe is used to transmit the air-pressure for a large system of pneumatic clocks distributed over Paris. The completed set of cables are those of the telegraph system.

A Bad Case of Boiler Scale.

Chicago, Ill.—To the Editor of "Domestic Engineering"—Sir: If you will call upon Harry Stanton, county plumber at the county building, corner of Michigan and Dearborn streets, you will have a chance to see one of the worst cases of boiler scale that has ever come to my notice. If you care to look this case up, wish you would give your opinion as to the cause of the pipes clogging up so, in the open letter department of "Domestic Enginering."

Answer.

A representative of "Domestic Engineering" called upon Mr. Stanton, as suggested, and found him to be a man who is very well posted on all matters pertaining to his trade. He willingly showed our representative sections of pipe which it had been necessary to remove from the heating system, because it was so badly clogged with sediment or scale. The section of pipe which we illustrate herewith is a fair average sample, certain portions of the pipe being comparatively clear of scale and other portions being somewhat more clogged than the piece shown. An elbow joint was so badly stopped up that a piece of copper wire quite filled the bore.

The section shown was taken from a vertical riser about 170 feet from the boiler, and had been in position not more than six or seven years. The heating system had been giving trouble for some time, and while Mr. Stanton had suspected what the trouble was, he was not prepared to find the pipe so badly fouled as it was. The pipe has been seen by a number of engineers and others, all of whom express surprise at the thickness of the deposit in a vertical pipe so far from the boiler. As to the cause, Mr. Stanton had no further explanation than that some freak of circulation had deposited the sediment as found.

As to the primary cause of the deposit it is doubtless due to the presence of a large percentage of bicarbonate of lime in the water used in the boiler. This substance is lime charged with a double

proportion of carbonic acid gas, which renders it very soluble in water, especially when the water is raised to a high degree of heat, the heat driving off the carbonic acid gas very rapidly and causing the lime to be deposited on the pipes and boiler flues, where it is baked to the hardness of limestone, which in reality it is. The only wonder is that some portion of the system was not entirely stopped, with the result of a disastrous explosion. The evil effects of boiler scale are too well known to need enumerating here, but in the light of Mr. Stanton's discovery it would seem as though Chicago water would bear a close inspection for other things besides the deadly microbe. As scale, once deposited in the pipes and boiler flues, is removed only with the greatest difficulty, precautionary measures ought perhaps to be adopted, such as the use of some chemical preparation which would set free the carbonic acid gas and cause the lime to be deposited out of the water before it is introduced into the boiler.

The use of such a softener or purifier would, of course, require a settling tank or cistern.

Lead and Its Characteristics.

To the Editor of "Domestic Engineering":

Sir: Will you have the kindness to publish something about the history of the manufacture of lead pipe?

Answer.

The best answer we can make to our correspondent is to reproduce a portion of a lecture by J. Wright Clarke, published as a part of the work on "Plumbing Practice," to which we take great pleasure in giving credit.

Lead Pipes

I have tried to find out who first made lead pipe without seam, and have not succeeded in getting the inventor's name, but have seen a machine for casting small pipes. The date, 1639, was cast upon it. This was called a "staffing and burning machine," and consisted of an iron mould made in two halves, and a core or mandrel of the same material, slightly longer than the mold. The mould was about 21 inches long, and after being put together and fastened with screw clamps, it was placed on its end, as shown at Figure 6, and melted lead poured into it. When the lead was set the mould was opened and the piece of pipe drawn upward on the mandrel, but not quite off it. The mould was then replaced and more molten lead poured in until it was full to overflowing, so that the end of the first piece that was cast became fused or melted and so joined to it. After this became cool enough it was drawn upward, and the whole operation repeated until a pipe was made of the length required. This machine was for making ¾-inch bore pipes.

For making larger pipes the lead was cast or rolled into sheets, and then cut to the size required and folded into the form of the pipe. This was then tightly filled with moistened sand. The edges of the lead to be joined were cleaned or shaved the required width, and pieces of iron, called "clams," placed on each side, so that the seam was left the proper size. Or, sometimes the pipe was buried in sand and a furrow left over the part

Fig. 6.

to be joined, with weirs at intervals for excess of lead to flow away. Lead melted and heated to redness was then poured quickly on the part to be joined until it was fused, the superfluous molten metal flowing away over the weirs, or, as some plumbers call them, the "gates." After pouring lead on as described, and before it sets, it should be probed with a piece of wood to make sure that the edges of the lead pipe are melted, care being taken not to disturb the sand core, as if that was done the pipe would be rough inside. Where it is intended for use as a pump-barrel this would have an injurious effect on the pump-bucket, and also prevent the proper quantity of water being discharged at each stroke of the handle, by allowing part to escape past. The pipe should be laid on its side and carefully levelled before pouring the lead

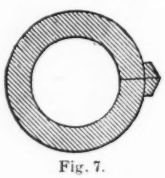


Fig. 7.

on the seam, or it would be thicker at one end than the other. After the lead is set the sand is all cleaned off and the raised seam trimmed up and left as shown in section, Figure 7. This old way of making lead pipes for pump-barrels is still followed in some parts of the country, and also in certain factories for special pipes for conveying certain kinds of acids, etc.

Bends of heavy lead are usually made in halves, and have a seam "burnt" (as it is commonly called) on each side, and when these bends are turned in more than one direction, it follows that the seams can only be made in short sections.

Sometimes heavy lead pipes are fitted and joined together with flanged ends and bolts, and although lead pipes of a light section can have flanges tafted, they are stronger with ends cast on them. This is done by filling the end of the pipe for some distance with wet sand, as at A, Figure 8, and then standing it upright with more sand on its outside, with the necessary space indented to the size and form of the flange required. The lead must be red-hot and free from oxide, or what is commonly called "dross," and must be poured as quickly as possible until the end of the pipe is completely fused, the superfluous molten lead flowing away as before described. Even after it is supposed that the union is complete, the pouring should be continued for some little time, as it frequently occurs that the part which can be seen at B is fused long before the part at C, and hence the pipe is weak just where a strain may be brought to bear when making a bolted connection. It is always necessary to cast these flanges a little thicker than required, as the lead shrinks in cooling, and leaves the surface so rough that it requires trimming. When pouring the lead on to the part to be united, good-sized ladles should be used, and great care must be taken not to disturb the sand by pouring from too great a height; doing this also cools the lead. For making large work it is sometimes necessary for two or three men to be pouring at the same time, and others fetching more melted lead to take their places in pouring. There must not be any delay, as the lead gives up its heat to the surroundings so quickly that it is soon set.

The earliest record of any patent for making lead pipes appears to have been granted, A. D. 1741, to James Creed, who invented a machine "for cutting sheet-lead into any required breadth, for the making of water pipes of any diameter and strength, * * * and the slips of lead so cut are turned up into pipes by means of rollers of wood, iron, etc., * * * and at the same time the edges are scraped fit for soldering by a tool fixed on the frame."

There must have been some improvement after this in the making of lead pipes, for in the year A. D. 1790 a patent

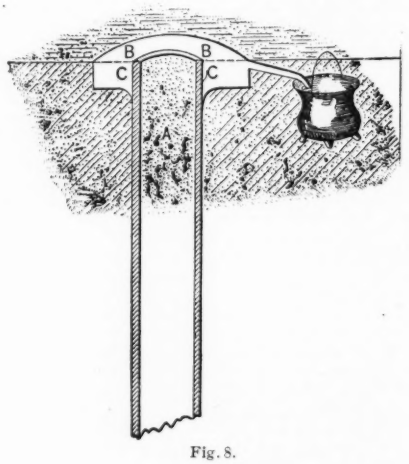


Fig. 8.

was granted to John Wilkinson, whose specification says: "I cast the lead in lengths, as is practised in the common way. This is put upon a polished rod or round mandrel of iron, or any other metal, such mandrels being made of different lengths and diameters, according

to the size that is wanted. This rod or mandrel, with the cast-lead upon it, is put repeatedly through or between rollers with grooves of different sizes, according to the external diameter required, and extended to the length or thickness ordered, or drawn through gauges or collars of different dimensions upon said mandrel, each succeeding collar being less than the former,etc."

About seven years after the above patent was granted, a great stride was made by Joseph Bramah, the inventor of the valve water closet, who took out a patent for preserving and drawing off liquors. Among the instruments described are "sundry tubes," and a method of making them.

On referring to this sketch of the pipe-making machine, Figure 9, it will be seen that it is literally a "lead-squirting machine," a title for which, I think, we have to thank the Americans, whose laconic description at once conveys to the mind the process, and which requires very little more explanation. It has been stated that Bramah never made pipes with his machine, that being impossible, but the idea originated with him, and other people have only improved upon it.

In the drawing—A is an iron melting pot; B, an iron or brass pump; C, the suction valve; D, the mould or tube; E, the core or mandrel; F, the fire; G G are flues; and H is the pipe as it issues from the nozzle of the mould.

The modern way of making drawn-lead pipes, from the smallest size used up to 6 inches in diameter, consists in filling a cylinder (which is kept heated by a fire and the necessary flues) with melted lead.

The bottom of the cylinder, which is movable and fits tightly inside the cylinder, is attached to the piston of a hydraulic ram, fed from an accumulator charged by pumps worked by a steam engine. The cylinder being charged with lead, and the engine started, the bottom is forced upward, causing the lead to escape through the die situated on the top. As the pipe issues from the orifice, it would naturally fall sideways and "buckle;" to obviate this, a cord is attached to the end of the pipe, and continued over a pulley fixed above the machine and kept taut by a man having hold of the other end. This is for pipes made and kept in straight lengths. Small-bore pipes, which are made in long lengths, are slowly wound on a drum by a man, who turns the drum fast or slow as the pipe issues from the machine.

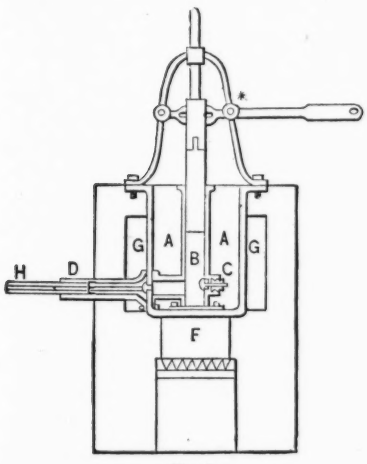


Fig. 9.

In addition to pipes of a round section, there are manufacturers who have machines for making them of a square section. This square pipe is perfectly true and even in substance, and there is no reason why any other shape should not be made, say, for instance, with moulded

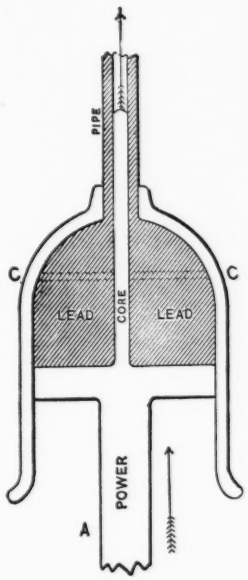


Fig. 10.

front running parallel with the length. Some architects prefer lead rain-pipes to iron ones, but they must either be content with plain round pipes or else pay rather heavily for hand-made ornamental ones, which often prevents their being used.

Fig. 11.

Most pipe-machines have the mandrel or core attached to the bottom of the cylinder, as shown at Figure 10. This mandrel gets bent at times, so that it is nearer to one side of the die or orifice than to the other, with the result that the pipe, as it issues, is thicker in substance on one side than the other. As the strength of a chain is only equal to its weakest link, so the strength of a pipe is only equal to that of its weakest side. Some makers, to obviate this, and get the pipe perfectly true and even in substance, put a bridge or guide-piece inside the cylinder some little distance from the top (see Figure 11, which is a section on C C, Figure 10), so that the mandrel may pass freely upward, but cannot get moved sideways. By this means the pipe is made more even, but it will not withstand such a bursting pressure, on its inside, as the other pipe will. The reason for this is that the lead when passing the guide-piece gets separated into two portions. These join together again afterwards, but as the lead begins to lose its heat at this point, and is not always fused, it is only joined by compression; so, although the pipe, as it issues from the die, looks perfectly even and in good condition, it will often be found to split when the plumber drives a tan-pin in the end.

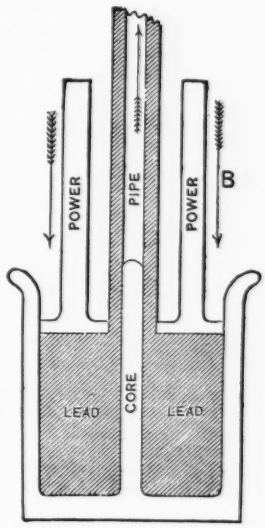


Fig. 12.

The amount of force required when making lead pipes is sometimes equal to a pressure of thirty-five to fifty hundredweight on the square inch, according to the size being made; but it is easily understood that there is a great loss of this power by friction. To save this loss of power, a machine was invented to minimize the friction. To gain this object, the bottom of the cylinder, and the mandrel to it, was firmly fixed, and the die, which was attached to the top of the cylinder, was forced downward, the lead escaping upward through the die. The sectional sketch, Figure 12, will illustrate what is meant.

When pipes are made by the machine, Figure 10, the enormous power brought to bear compresses the lead as closely and compactly as possible, but it is doubtful if the machine last described does this so effectually.

Sometimes lead pipes, as they issue from the die, are passed through molten tin and a resin flux, by which means the lead becomes coated with tin. There are other patent means by which a tin pipe is covered with a lead pipe.

Lead-encased tin pipe is made in the same manner as the ordinary lead pipe, excepting that the lead "slug" is cast with a hole through its center, in which is placed a core equal to the internal diameter of the pipe to be made. The space between the core and the lead slug, which is left large or small according as it is intended the substance of the tin pipe shall be, is filled up with tin. When the whole is heated and forced through the die it is found that the two metals issue in the proper proportions, are perfectly true in section, and, on being cut open and bent or twisted in any direction, cannot be separated.

The two metals do not mix and form an alloy, as would appear probable at first sight, and when the specific gravities are compared one would be apt to think that the lead would sink to the bottom, but it is found possible to make this pipe of equal substance both in cross and longitudinal sections.

Gasoline Lighting.

NO line of business of recent date has been more completely revolutionized and has made more rapid strides than the lighting business. One does not have to tax his memory severely to recollect the time when coal oil lamps or candles was the only light known to the rural districts, while large and small cities alike were content with the poor service offered them by the gas companies, for which they paid an exorbitant price.

The introduction of electric arc and incandescent lamps solved the problem in cities as far as efficiency was concerned, though they have never furnished an economical light. Especially is this true in the smaller cities and towns, where exceedingly poor service is often rendered by the eletric light companies.

For this reason there has been a long felt need for an economical yet efficient light which, we believe, the gasoline light is destined to fill. It was only about five years ago that it was discovered that a brilliant incandescent light could be obtained from gasoline at a very moderate cost. The popular prejudice against gasoline at that time was so great that the inventor for a time had a hard row to hoe. The general public were under the impression that gasoline ranked next to nitroglycerine as an explosive. They had yet to learn that gasoline gas, to be explosive, had to be mixed with the proper proportion of air, and was in reality less dangerous than city gas, simply needing, like a live wire, to be handled with care and intelligence.

Now the public is beginning to learn that a well constructed gasoline light is not only the most economical and efficient light but one of the safest when handled with ordinary intelligence. As an evidence of this, three years ago there was one small factory manufacturing gasoline lights, while today there are seventy-five large concerns, capitalized at from $10,000 to $150,000, the largest of which employs 200 men.

As an economical light gasoline has no superior. By practical tests it has been found that an equally brilliant light can be obtained from gasoline at one-tenth the cost of electricity or city gas. While it equals any other light in brilliancy it has neither the flicker nor the glare of an electric arc.

Like all other new business ventures the gasoline lighting has had many obstacles thrown in its way. Some manufacturers, whose chief motive has been to lessen the cost of the gasoline lamps rather than increase their efficiency, have placed on the market poorly constructed lamps, which have not given entire satisfaction.

In order to co-operate with the insurance companies and improve the standard of lamps the manufacturers of gasoline lamps have recently formed an association. The insurance companies have experts who carefully examine the lamps of each manufacturer, and before they pass on his lamps the manufacturer is compelled to give the insurance companies a guarantee that the present standard of efficiency and workmanship will be maintained. The manufacturer is required to place his name on each lamp so that the user, as well as the underwriter, will know who is responsible for any defective lamp.

The first successful invention in the way of a gasoline light was in the form of individual lamps, which have proven a great success where but few lights were required. However, there soon arose a demand for a gasoline lighting system for factories, stores, offices, and large residences and public buildings, which would supply a large number of lights with more convenience and economy than an equal number of individual lights.

To meet this demand several manufacturers have placed on the market lighting systems of different types which will operate from 10 to 200 lights. These machies are quite inexpensive in themselves and can be installed at a very low cost. This system of lighting is almost as convenient as electricity and when the machines are installed by a competent workman are absolutely safe.

Not only is it evident that gasoline lighting has come to stay, but it will eventually bring about the cheapening of all forms of lighting, since gas and electric light companies must needs reduce their prices to meet the growing competition of the gasoline system, which has both brilliancy and cheapness to recommend it.

Will Exhibit at Buffalo.

The American Acetylene Stove Co., through A. J. Murdock, advises us that they will make an exhibit at the Pan-American Exposition at Buffalo of their "Alpha" acetylene cook stove. We are quite certain that this stove will attract universal attention in the acetylene department at the exposition. It is, so far as we are aware, the only gas stove using acetylene, and hence all manufacturers of acetylene apparatus, as well as installers of them, are interested in the stove, as it increases the use of acetylene and makes the acetylene gas plant complete. By its use the detached country residence is as well supplied with gas cooking appliances as are more fortunately located places in large cities. The "Alpha" gas stove will do remarkable work, as is shown by the following statement of tests which have been made as to the intensity of the heat produced with the acetylene burner using six feet of gas per hour:

Can raise one gallon of water from 60 deg. to 212 deg. in 17 minutes.

Can melt 4 lbs. of lead, melting point 600 deg., in 20 minutes.

Can melt 5½ lbs. babbit metal in 23 minutes.

Can melt 3 lbs. zinc, melting point 770 deg., in 30 minutes.

Can melt 3 lbs. zinc, with burner and blow pipe, in 10 minutes.

This stove is adapted for use with any acetylene generator and the burners are so designed that the feed valves will adjust the flow of gas to the burner to meet the variation of pressures of different generators. This is a very important fact, as perfect combustion of acetylene gas depends upon the ratio of gas supplied to square inches of burner surface. The combustion in this stove is claimed to be perfect and is secured by just the proper admixture of air and gas before reaching the burner. A very interesting statement is made by the manufacturers to the effect that acetylene gas contains twice the heat units contained in artificial gas and is so rich in carbon that nine parts of air to one part of gas is the usual mixture required to obtain perfect combustion and produce a blue flame, which is necessary for heating purposes. The stove makes no odor or smoke. The makers of the gas stove claim great safety with their burner. The price of the stove is exceedingly reasonable and plumbers who handle acetylene apparatus should communicate with the manufacturers and see if they cannot obtain the agency for this interesting device. Those who do not handle acetylene apparatus should certainly get in the way of doing so. When writing to them, it would be a kindness to us if you would mention "Domestic Engineering."

Acetylene Gas for Light-Houses.

Consul-General Guenther, under date of Frankfort, March 4, 1901, reports that at the light-house of Altenbruch, acetylene gas has been experimented with, as the strongest petroleum light proved too weak for this station. It is stated in German papers that the results were entirely satisfactory, and it is expected that acetylene gas will now be used extensively for light-houses.

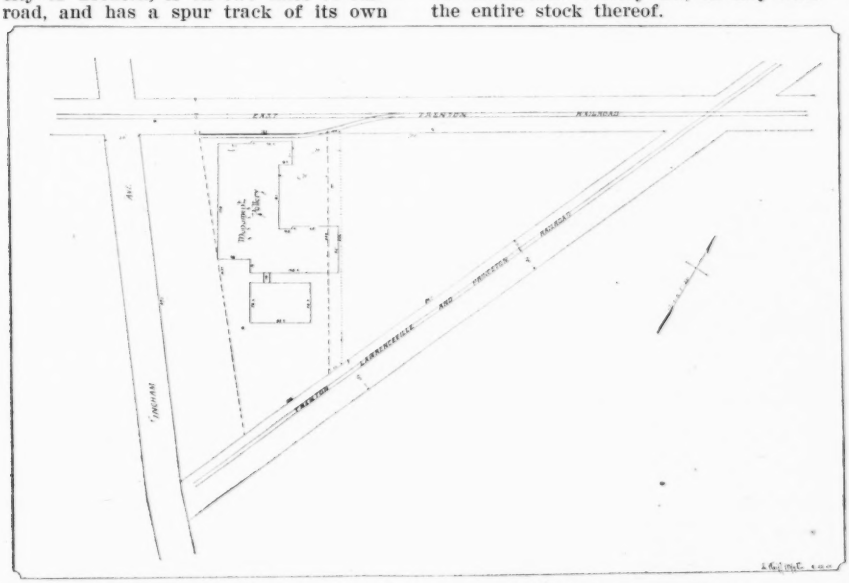
Will Have Larger Quarters.

The Chicago Solar Light Co., at present at 81 5th avenue, Chicago, manufacturers of incandescent vapor gas lamps, arc and street lamps, fixtures and supplies, will on May 1 move to larger quarters at 132-134 Lake street, and their factory will be moved to Kenosha, Wis., in the plant of the old Sterling Cycle Works, where they will have an almost unlimited capacity for the production of their goods.

Wolff Company's New Pottery Plant.

We present herewith the ground plan of the Monument Pottery Co. Works, of Trenton, N. J., recently purchased by the L. Wolff Mfg. Co. The boundary lines immediately near the building lines are those of the original property. The neighboring property on both sides of these lines indicates the additional property that they have purchased, the new company now being owners of the whole triangle, comprising an area of about five acres.

The plant is very favorably located, being within a mile of the center of the city of Trenton, is on two lines of railroad, and has a spur track of its own



entering the works for the loading and delivery of all material.

Ingham avenue, on the west of the property, is a macadamized paved street, having an excellent road bed and is a thorougfare to that section of the city.

The stockholders and officers now are identical with those of the L. Wolff Mfg. Co. Temporarily the name of the old company is retained, but it is contemplated to change the corporate name to the L. Wolff Mfg. Co.

The old manufacturing organization, together with the superintendent, will be retained.

There have recently been added to the plant two additional kilns of large size, thus doubling the capacity of last year, and the new owners have immediately started two more kilns, thus farther increasing the output, so that within a few months, the plant will be taking care of all requirements. The expansion in the future will be commensurate with all demands.

The grade of goods turned out have not hitherto been surpassed by any in the market, and the quality will be improved if that be possible. The line includes all kinds of solid porcelain ware, such as French and Roman baths, baths on base, hip and pool baths, sinks and laundry tubs, water closets and urinals, urinal troughs, mangers, floor slabs, etc., etc.

Mr. Hoelscher is temporarily in charge of the plant, representing the company there, and he will give all correspondence necessary and careful attention. All orders on hand will be filled with all possible dispatch, and to the satisfaction of customers.

The stockholders of the L. Wolff Mfg. Co. are now responsible for the acts of the Monument Pottery Co., as they own the entire stock thereof.

A Hustler in the East.

Charles S. Stephens, formerly eastern representative of the Riverside Iron Works, has been appointed general sales agent for all eastern territory, including the Pittsburg district, for the Penn Radiator Company. The New York office of the Penn Radiator Company, whose principal plants are at Corry, Pa., will be at 21 Beekman street. They will continue to manufacture and supply the trade with their indirect and celebrated flue radiators, and are also now ready to furnish the loop and wall pattern of all classes and sizes. They guarantee these to be second to none in quality and appearance. A large stock will be carried and orders promptly filled. All communications regarding prices, orders, shipments, etc., should be directed to Mr. Charles S. Stephens, 21 Beekman street, New York City, who will be found to be a hustler in this line of business, with a penchant for getting and attending to business with the utmost dispatch.

John Ewinger, Burlington, Iowa, recently placed Cooper's Nautilus closets in a residence in that city.—Adv.

Use of Water Meters.

In his annual report for the year 1900, Superintendent Ingersoll, of the Schenectady, N. Y., waterworks, favors the use of meters as a means for reducing water waste. In the following table he compares the per capita amount of water pumped each 24 hours in 7 metered cities, with the per capita amount pumped in non-metered cities. Metered cities: Yonkers, N. Y., 40 gallons; Madison, Wis., 41; Utica, N. Y., 53½; Fall River, Mass., 35; Providence, R. I., 53; Rochester, N. Y., 83; Bangor, Me., 80. Non-metered cities: Albany, N. Y., 191 gallons; Cleveland, O., 154; New Haven, Conn., 150; Nashua, N. H., 166; Detroit, Mich., 147; Buffalo, N. Y., 195; Schenectady, N. Y., 166.

A New Jobbing House.

Grand Rapids, Mich., is the strategic point which a new jobbing house has selected in which to establish a business. The company will be known as the Sanitary Supply Co. and it will be partner-

C. N. Marcellus.

ship between Horace S. Hubbard, C. N. Marcellus and Chas. A. Miller. Messrs. Hubbard and Miller are of the firm of Miller & Hubbard, of Sturgis, Mich., manufacturers of plumbers' woodwork. Mr. C. N. Marcellus is one of the best known traveling men in the west, for a number of years having been associated with the National Supply Co., of Toledo, but lately with the J. L. Mott Iron Works, of New York City. It is their intention to carry a stock of about $25,000 worth of plumbing and heating supplies. They have a building containing 8,000 square feet of surface on Ottawa street, between Fulton and Louis. The building is entirely new, is very well lighted and contains elevators and excellent office rooms. It is the intention of the company to begin putting in their stock at once.

A 45-SECOND HEATER.

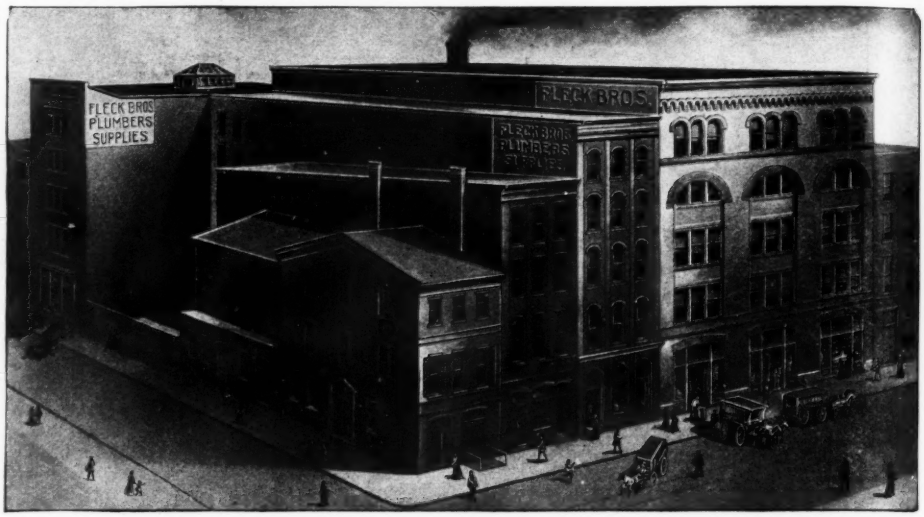
The Beckley-Ralston Co., 178 Lake street, Chicago, manufacturers of the Bystrom Cleanable Burner and the Bystrom gasoline lamp, are just placing a new burner on the market—a generator which will require but 45 seconds' time. They state that this burner is smaller and lighter and more simple than any which they have ever seen.

AMPLE FACILITIES.

The accompanying illustration shows at a glance the ample facilities which Fleck Bros., of Philadelphia, Pa., will have for handling their rapidly increasing trade as soon as their new building is completed. It may be said that Fleck Bros. have rapidly crept up to be one of the largest jobbing firms in the United States in a few years, through progressive and fair methods and all congratulate them upon their success. Their addition will give them a frontage of 80 ft. 6 in. on North 5th St., and 100 ft. deep, while they also have a frontage of 18 ft. on Cuthbert street, by a depth of 75 ft. The L shape of their buildings is of the utmost value on account of the frontage thus obtained for the rapid movement of goods.

The ground floor of the new building, which, by the way, when completed will contain every modern facility that will tend to enhance the proper distribution and sale of goods. There will be a show room for fine plumbing goods 40x100 ft., and a salesroom 20x100 ft.

The second floor will be occupied by the general offices and a showroom for staple goods. The third, fourth and fifth floors will be used for warehouse purposes and it is needless to say that goods will be stored to the ceilings.



The Cuthbert street building will be used entirely for a packing and shipping department. Thus it will be seen that they will have very extensive storage facilities, together with the most ample provision for all departments which will aid the carrying on of a first-class extensive wholesale business. Business may be said to be brisk with Fleck Bros. at all times, as they are always on the alert for trade in any quarter of the United States or Canada.

W. P. Oglesby, Philadelphia, is remodelling the plumbing in the house of Chas. H. Strong, using nine of Cooper's Nautilus closets.—Adv.

ON MERIT.

The G. M. Davis Regulator Co., of Chicago, received an order last week for immediate shipment of one hundred Davis Pressure regulators to conform with the specifications of one of the largest engineering and manufacturing concerns in the country. The week before they shipped a large order for automatic relief valves for condensing engines, the order including one 30-inch, two 20-inch and one 18-inch valve. They report the popularity of their specialties ever on the increase, owing to the demand for the best grade of appliances which they have always advocated. They take especial pride in the above orders since they were sold entirely on the merits of their valves.

Edward B. Andrews, Camden, N. J., is plumbing the residence of Mrs. Nowlton, using Cooper's Reno closets, baths, lavatories, etc.—Adv.

SELLING STOCK FAST.

The Ridgway Register Company, 6 Portland St., Boston, Mass., have on exhibition their new dust proof register, which is attracting considerable attention. The stock is finding ready sale and this excellent register will soon find its way into every state in the Union. It closes on the surface even with the floor and consequently no dust can collect in the register or furnace pipes. The surface indicates whether it is open or closed and one or two valves alone can be opened when desired. It remains closed tight on the surface all summer, embodies great strength, and is of the simplest construction. No screws appear on the face and it is only two-thirds the depth of other registers, which is of great advantage when used in a wall. These new registers are handsomely electro-plated and are very handsome in appearance.

Never wears brassy

WHITE METAL CLEAR THROUGH

that's the whole story—but it means that after once in the house it's **there to stay!**

No ripping out of the whole plumbing because the tubing surface has been rubbed off, leaving it unsightly. "Benedict Nickel" Seamless Tubing may be rubbed forever,—it **always remains silvery white.**

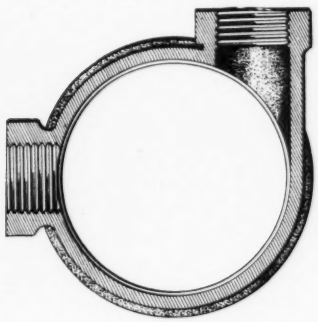
253 BROADWAY, N. Y.
172 HIGH ST., BOSTON.

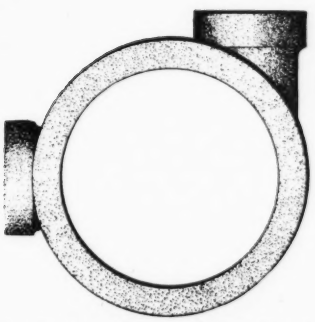
"Send for illustrated booklet on "Benedict-Nickel"—sent free to any one"

BENEDICT & BURNHAM MFG CO
Waterbury Conn

A Circulating Hot Water Fitting.

We illustrate herewith the Phelps Ideal Single Main Circulating Hot Water Fitting, a simple and cheap fitting for use on single main heating jobs, which is said also to be just the thing for use in steam where a circulating valve is





used. It is made for 3-inch, 3½, 4, 4½ and 5-inch mains and can be used either right or left. For further particulars and price lists write to the Ideal Heating Co., of Oskaloosa, Ia., who will gladly grant all requests for printed matter if you mention "Domestic Engineering."

H. C. Archibald, Stroudsburg, Pa., is plumbing the new hotel at Mt. Pocono, using Cooper's goods throughout. There are a large number of closets, baths, lavatories, etc., in this operation.—Adv.

Building Commodious Warehouses.

The Berger Bros. Co., of Philadelphia, Pa., are erecting in connection with their present building on Arch street, a five-story warehouse for their output. The structure will be of brick with terra cotta trimmings, and measures 53x73 feet. They will also build a one-story office building next to the new building.

Saml. R. Smith, Philadelphia, is plumbing the Turnbull residence, using a number of Cooper's closets, baths, etc.—Adv.

Build Auto Boilers.

The Steam Carriage Boiler Company, of Oswego, N. Y., has recently moved into their four-story building, on First street, and equipped it throughout with entirely new machinery. The company is prepared to deliver steam boilers of any design for automobiles, yachts, launches, etc.

This company, which was lately incorporated, with A. P. Murdoch as president, L. W. Mott as secretary-treasurer, and C. A. Kitts as general manager, has had large orders for its seamless cold-drawn steel boilers and these are kept constantly in stock to meet the increasing demands. Mr. Kitts has had wide experience in making boilers for motor vehicles and many of the improvements on the boilers now in use were originated by him. He is a thorough mechanic who grasped the requirements of the trade, and the company he is associated with will undoubtedly occupy a leading position in its sphere of motor vehicle industry.

Messrs. Murdoch and Mott are energetic young men, who stand high in the business and financial affairs of Oswego, and who have demonstrated splendid ability in the rapidity and completeness with which their new factory was gotten ready for work.

The company has its own boiler of special design and construction, but it will build a boiler of any required design. A great many of those being shipped are constructed with the celebrated "dry plate," which prevents foaming and which being placed above the water line in the boiler, gives hot air chamber between the plate and the boiler head, where the steam is superheated, thus rendering it dryer and of greater energy.

Elect New Officers.

The Universal Sanitary Manufacturing Company, of New Castle, Pa., has elected the following officers: President, C. J. Kirk; vice-president, Edw. King; treasurer, J. W. Knox; secretary, George Pryor; general manager, H. F. Weaver.

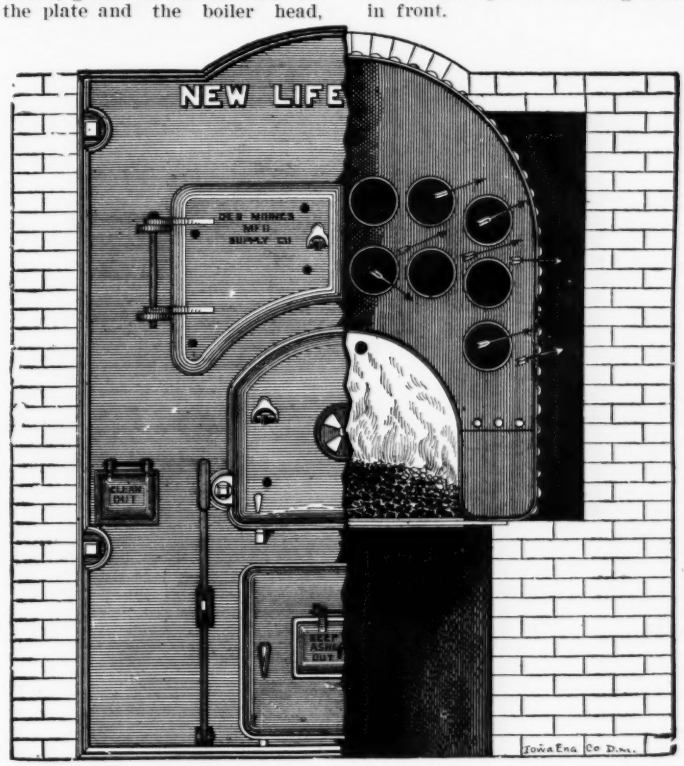
The company has recently broken ground for their large manufacturing plant, and expects to have goods ready for market by August 1st. The first department to be put in running shape will be the pottery, which will occupy about 50,000 square feet of floor space, and will be very complete and up to date in every part. The company will manufacture nothing but first-class goods in the various lines which they will take up.

H. F. Weaver, the new general manager, is a man experienced in the manufacture of plumbers' specialties, having resigned the position of president and manager of a Pennsylvania firm manufacturing a full line of brass goods. Under his management the Universal company should make a success of the work they have undertaken.

The "New Life."

We illustrate herewith the "New Life," brick-set, double-return boiler, a front view, showing front flues, firing, draft, ash and cleaning doors, shaking lever, with part of front cut away, showing part of end of boiler, fire-box, flues, direction of draft; also showing heating surface and large ash-box, and style of brick-setting.

This boiler embraces all the valuable features of the locomotive fire-box. By keeping the heat concentrated until it reaches the flues, which are large in diameter, it enables the heat to pass to the front end rapidly; it is then returned on both sides to back end and chimney. Any deposits of soot or ashes striking the perpendicular walls of the boiler are deposited at the bottom and easily removed through the cleaning door shown in front.



This style of boiler is well adapted to heating large or small buildings or greenhouses, as they are very simple and easily cared for, and adapted to either hot water or steam. It is manufactured by the Des Moines Manufacturing and Supply Company, of Des Moines, Ia., who will be pleased to furnish you with full particulars and price list if you write mentioning "Domestic Engineering."

Assistant Manager of N. Y. Office.

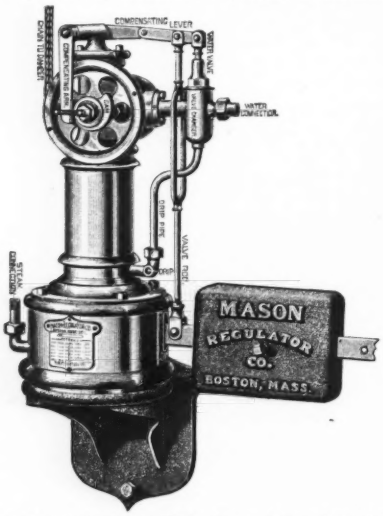
The Ashton Valve Co., of Boston, Mass., have appointed Mr. Frank J. Corbett as assistant manager of their New York office, 121 Liberty street. He will more especially introduce their line of Ashton Pop valves and steam gages among the architects and stationary engineers of Greater New York.

For Mexico's President.

The Great Western Pottery Co., of Kokomo, Ind., are in receipt of an order for several of their low-down earthenware tank combinations for the palace of President Diaz of Mexico. These are to be especially decorated to suit the taste of President Diaz, and will probably be as handsome an outfit as has ever been manufactured.

The Mason Damper-Regulator.

The illustration shown herewith is of the Mason hydraulic damper regulator. This is a high-grade device for regulating the dampers of boilers. It is controlled by variation of the boiler pressure, the motive power for opening or closing the damper being water pressure, which can either be taken from the street main or from the boiler itself. The steam from the boiler enters the regulator through the tube marked "steam connection," thence under a heavy rubber diaphragm. By acting upon this diaphragm it opens or closes the auxiliary water valve, through the valve rod and admits water pressure to actuate a piston contained



in the cylinder. This turns the wheel to which the chain to the damper is attached. In order that the damper may not be entirely opened or closed at each change of steam pressure, a compensating arrangement is provided which is worked by the action of the cam upon the chain wheel. The regulator is made of the best steam metal and is an ornamental and useful machine for the engine or boiler room. Like all the Mason devices, it is a high-grade instrument for accurate service. Upon application to the Mason Regulator Co., 6 Oliver street, Boston, Mass., prices and discounts on this device will be sent.

Grant, Jenkins & Co., are plumbing the residence of Col. John I. Rogers, at Wyncote, Pa., using a large number of Cooper's finest closets, lavatories, baths, showers, etc.—Adv.

No Advance in Enameled Ware.

Francis J. Torrance, vice-president Standard Sanitary Mfg. Co., in answer to an inquiry as to the condition of trade, and the rumor that there was about to be an advance in the price of bath tubs and enameled ware, puts the quietus on this rumor as far as he and his company are concerned. Mr. Torrance said: "There is positively no foundation for it, so far as our company are concerned. We do not have the least expectation of a change in price, either higher or lower, at the present time, or anywhere in the near future, for that matter. We believe the price now ruling is based on the price of material and labor and is equitable. As to any changes in the metal market affecting it, this is not the case with our company. Our purchasing department has contracted for metal and other supplies in sufficient quantity to run us well through the year. We bought iron very largely early in the season and before any thought of the recent advance. We have also bought other supplies, and so far as I know the labor questions are settled as far as we are concerned, so that there is no reason for our advancing prices. The volume of business at home and in our foreign department is very gratifying indeed, and we are well pleased with the situation. Our principal plants are running full and satisfactorily."

The Bordo Plug Valve.

Considering the various uses for valves and the degrees of treatment they receive, it is not at all strange that many are found to be troublesome in their action or wear. The blow-off valve of a steam boiler is an example of this kind. Every engineer has had experience along this line.

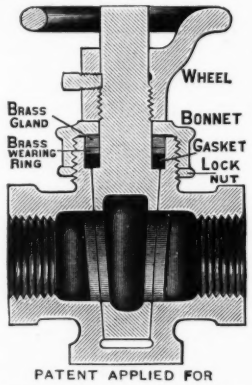
As can be seen from the sectional view the valve consists of a taper plug having a port extending directly through it. This plug is accurately turned, and fits snugly into a tapering seat bored in the body of the valve. When this opening is in line with the inlet and the outlet of the valve, a free passage is opened, which, by the size of the port in the plug, is of area equal to the area of the pipe, thus giving free passage to the fluids contained in the pipes. A quarter turn is all that is necessary to close it tightly, making it very valuable as an emergency stop valve.

By virtue of the plug construction, there is no possibility of grit working between the plug and its seat. The valve never lifts from its seat, but simply rotates.

The idea of the taper plug is not new. But in the Bordo valve the novelty lies in the perfect balancing of the valve, making it possible to turn even the largest sizes by hand without the use of wrench or lever. The valve is balanced mechanically. It will be noticed that the wheel is screwed to the stem and fastened by a set-screw. The lower edge of the hub of this handwheel bears upon the top of the bonnet, which can be screwed down to any point on the body of the valve, thus lowering the plug into its seat.

When the pressure of the fluid comes upon the valve, it tends to raise the plug. To take up the friction which is set up when the valve is turned, two brass rings are put in around the stem, the upper one, or brass gland, being stationary against the bonnet, and the lower one turning with the stem and gasket. The friction and wear is between these two rings and is broken.

The valve stem is made with a square head, to be used as a hold for a wrench, although the handwheel gives sufficient leverage for underground piping. No amount of hammering on the stem can drive the plug into its seat. It is always tight, yet does not stick. The slight wear in its use is taken up by loosening the bonnet and allowing the plug to extend further into the seat.



PATENT APPLIED FOR

The Bordo valve is made either flanged or screwed, and in all sizes.

It is valuable in boiler work, either as a blow-off valve, water column valve or emergency valve. It is manufactured by the Bordo Valve Co., 113 N. 12th street, Philadelphia, which company is incorporated under the laws of Pennsylvania, and of whom further information may be obtained regarding this valve.

W. F. Arkinson, Boston, Mass., are plumbing a residence in that city in which they are using three of Cooper's Nautilus closets.—Adv.

No top washers or packing
No small nuts or fine threads
Both seat & washer accessible
Quick and easy to operate

Features of the Apex Faucets obtained by a radical change in the construction of the working parts.

MADE ONLY BY

Homer Brass Works
(Incorporated)
231 Race St., Philadelphia
Established 1828

Mulligan & Schermerhorn, Troy, N. Y., have some fine work on hand in which they are using Cooper's Nautilus closets. —Adv.

"KENNEY SYSTEM"—INSTALLATIONS DURING 1900.

The Kenney Company, 72-74 Trinity Place, New York City, have issued a list of installations of the Flushometer, Kenney System during the year 1900 from which architects, plumbers and others will gather much information that is of interest.

The Kenney Company are the sole manufacturers of this ingenious system of flushing water-closets and which is now accepted as a standard feature in modern plumbing.

In office buildings, private dwellings, hotels and restaurants, hospitals, schools and structures of all kinds where the most convenient, efficient and sanitary fixtures are required the installation of the Flushometer is indicated and even the most cursory examination of the equipments made during 1900 as given in the list mentioned shows a wide appreciation of its merits.

No less than forty-five public buildings in the United States and Canada have been equipped with the Flushometer during the year, including the new city prison, New York City, which, when completed, will have in operation a system of 378 Flushometers; the U. S. Treasury Building, Washington, D. C., comes next with 120.

More than one hundred office buildings have been supplied in the same time. Among others of prominence we may mention the Prudential Life Building, Newark, N. J., with 322, and the famous Broad Exchange (the largest office building in the world) with 235. Almost all of the other well-known office buildings completed during 1900 in New York and other large cities, in the United States and Canada, are in the list as well as equipments for buildings in Mexico, Australia, the Hawaiian Islands and foreign countries.

Twenty apartments in New York City, Philadelphia, Boston, Hartford and Toledo have been equipped with the Flushometer, the largest number of closets placed in any one building being 70 in the Ormonde Apartments of New York City.

Forty-three hotels and restaurants are now using the device, the total number of closets numbering over 1800. Of these five hundred and fifty are being installed in the Hotel Ansonia (Stokes) New York City. Other hotels of note include the Hotel Manhattan addition, New York City, Grand Union and United States hotels, Saratoga, N. Y.; New Frontenac, Round Island, N. Y.; Oriental, Manhattan Beach, N. Y.; Hotel Traymore, and Haddon Hall, Atlantic City, N. J.; Hotel Hygeia, Old Point Comfort, Va., and Plymouth Annex, San Francisco, Cal.

The Flushometer has been found especially adapted also for marine use and the Kenney Company give a list in their pamphlet of fifty U. S. government transports, lake steamers and private yachts which employ a total of 800 closets flushed in this up-to-date way and which they have installed.

Factories, shipyards, mills and manufacturing establishments generally have adopted the Flushometer, as well as a large number of prominent colleges, schools, churches and hospitals. The Lying-In-Hospital of New York is equipped with 130.

The Chinese Eastern Railroad, Siberia, Russia, have installed 50 in their new office building, and the system is also used in the various stations of many of the prominent railroads in this country, including the new depot of the Pittsburgh & Lake Erie, Pittsburgh, Pa., with 110.

The list of installations, which by the way is only a partial list, concludes with over 300 private residences equipped by the Kenney Company. Copies of the pamphlet may be obtained upon application.

S. Faith & Co., Philadelphia, are overhauling the plumbing in the Gilman residence, Chestnut Hill, using Cooper's goods.—Adv.

TYPES OF AUTOMATIC BOILER PRESSURE CONTROLLERS FOR MECHANICAL DRAFT.

Mechanical draft, and especially mechanical induced draft may safely be characterized as the economy factor of modern boiler practice. Of the many advantages following in the train of induced draft none has been so instrumental in causing its rapid introduction and development as the marked savings effected thereby. The modern captain of industry is not slow to take advantage of any improvement which may serve to cheapen the first cost of his equipment and the same time materially increase the efficiency thereof.

The essential feature of mechanical induced draft may be said to reside in the application of a fan between smoke box and stack to create the draft which is necessary to supply oxygen to the fuel and which it has been the function of the chimney heretofore to produce. In the case of a fan installation the stack ceases to become the draft agent and hence need only to be of a height sufficient to discharge the gases so as not to be obnoxious. The heat of the gaseous products of combustion is now no longer necessary, as in the case of the chimney, to create the necessary draft and may therefore be extracted by the agency of economizers or feed water heaters, thus reducing to a minimum the greatest source of loss which the boiler plant knows.

It will be seen that instead of being a fixed quantity as in the case of a chimney, the intensity of the draft may be varied by means of the fan engine speed. Thus when increased steam consumption or other causes occasion a fall in the boiler pressure, the deficiency may be made good by an extra turn of the fan engine throttle. It often becomes desirable that this regulation for a constant steam pressure should be made automatically, and this is easily accomplished by placing a pressure regulating valve in the steam pipe of the engine which drives the fan. Such a device may be so adjusted as to cause the fan engine speed and hence the intensity of draft to be increased whenever the pressure tends to fall off, thus giving a very nearly constant boiler pressure.

In these days, however, the steam engine is by no means the only motive agent which is utilized for fan driving. In many situations the electric motor, either belted or direct-connected, has been found to be by far the most suitable arrangement for fan work, being peculiarly adapted to such service by reason of the identity of motion of the driving and driven portions of such a combination. The application of motors

CORNER CLOSET

When you want a closet you may want one bad, or you may want one to go in a corner.

The O. K. Manufacturing Company

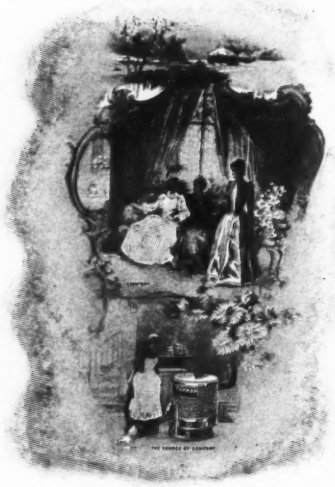
Ann Arbor Michigan

for driving the fans of induced draft plants has involved the problem of speed regulation for a constant steam pressure as in the case of the steam driven fan heretofore mentioned. This problem has been adequately solved by the Buffalo Forge Company of Buffalo, which company in its various mechanical draft installations is now able to arrange for automatic control of the fan motor speed. This is effected of course through the medium of a special motor controller actuated by fluctuating boiler power. In this way exceedingly close regulation of the boiler pressure can be obtained with a minimum need of attention on the part of the fireman though of course it is not to be implied that the latter individual under such arrangements need become simply a figure-head.

Herman H. Russ & Sons, Albany, N. Y., are plumbing a fine residence in that city, using Cooper's Nautilus closet.—Adv.

CAUSE AND EFFECT OF COMFORTABLE HOMES.

The illustration which we publish herewith is designed to demonstrate at a glance the cause and effect of a comfortable home in winter. We believe that the average steamfitter will appreciate that their prospective customers are interested in having their homes run on much the same basis as is shown by this illustration. Those who feel that they would like to be able to talk this kind of an argument



to their customer, should send to the Herendeen Manufacturing Co., Geneva, N. Y., for their various lines of printed matter describing their large and complete line of boilers. When writing, Domestic Engineering should be mentioned.

J. L. Hannify, Waltham, Mass., recently set Cooper's Nautilus closets in a residence in that city.—Adv.

Continued on page XXXVI.

A HANDSOME CATALOGUE.

Our catalogue library has been increased by one—a handsome catalogue of everything good in the hardware line manufactured by the Peck, Stowe & Wilcox Co. There is also a full list of mechanics' and tinsmiths' tools and machines. This company's New York offices and salesrooms are at 27 Murray street and 31 Warren street. It also has factories at South Hampton, Conn.; Plantsville, Conn., and Cleveland, O.

TRADE WANTS.

WANTED—CORRESPONDENCE WITH A competent wet process enameler. Address "H," care of Domestic Engineering, 58-64 N. Jefferson Street, Chicago, Ill. May-June-5-11

WANTED—SALESMAN WANTED TO SELL a new novelty in Pocket Knife for plumbers, mechanics, horsemen etc. Brand new! Great seller! Address F. A. Newell, 76 Park Place, N. Y. City. t.f.

WANTED—TRAVELING MEN TO CARRY our line of sanitary specialties as "side line." We only want those who can furnish the most satisfactory references. Address in perfect confidence, 506 care Domestic Engineering, 64 N. Jefferson Street, Chicago. t.f.

TRAVELING MEN, ATTENTION—WE HAVE some taking specialties in the heating line which we desire traveling men to present as "side lines" to the trade. We shall be glad to correspond with those who can furnish satisfactory references. Address, 1882, care Domestic Engineering, 64 N. Jefferson St., Chicago. t.f.

PLUMBERS AND STEAM FITTERS MAKE best agents for specialties in sanitary and heating lines. We desire five hundred plumbers and steam fitters of good repute who can furnish satisfactory references, to act as introducing agents for our specialties to the consuming trade. We pay liberal commission but only desire to do business with those whose reference is satisfactory. Address, 1817, care Domestic Engineering, 64 N Jefferson St., Chicago t.f.

BIG RETURNS FOR SMALL CAPITAL. WE have just succeeded in securing the exclusive control and manufacture of the celebrated Doran Hydro-carbon lighting system, which is the best system light yet invented for interior and street lighting. Each lamp gives 1200 candle power light, can be turned on or off instantly, the same as electricity. Absolutely safe, simple and satisfactory. Correspondence solicited from all interested parties and municipal officers and those who would like a good paying business in their own city or town. Acorn Brass Works, 15 to 21 E. Jefferson street, Chicago, Ill. 9-19

Many heaters are "good" only in the imagination of their makers. They fail in "zero" weather, but make great records in the early fall. Try a "Winchester" steam or water heater and see the difference. It makes heat. For prices write Smith & Thayer Company, Boston, Mass.

Domestic Engineering

Monthly Edition

The leading paper in the world devoted to

Plumbing, Heating, Lighting, Ventilating

JNO. K. ALLEN, . . President and Editor
HERBERT T. SHERRIFF, Assistant Editor
FRANK P. KEENEY . Business Representative

Telephone Monroe 816

58-64 N. Jefferson St. (near West Lake) . . Chicago

ELMER CRAWFORD . . . Eastern Manager
89-91 Centre Street, New York City.

Business Representatives.

New York Office, ... 89-91 Centre St.
Telephone Franklin 1680
ELMER CRAWFORD
FRANK P. TURNER

In the Field

John R. Keeney. C. M. Carrier.

Mechanical Departmeut

F. Chas. Hill . . . . . Superintendent
Evan H. Sample . . . Foreman Pressroom

Subscription Rates

Monthly edition, two dollars a year, payable in advance; single copies, twenty cents each. Weekly edition, three dollars a year, single copies ten cents.

Advertising Rates

Monthly edition, one inch, forty-five dollars a year. Graded discounts on larger spaces. Guaranteed positions extra. Copy and cuts for advertisements in this edition should be received by the first of month. We cannot guarantee insertions or changes in advertisements if received later than that date.

Entered at the Post-office in Chicago, Illinois, as mail matter of the second class.

Member of the Chicago Trade Press Association.

MAY 15, 1901.

THE FLUSHOMETER

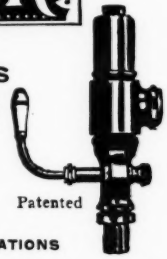
Showing application of Flushometer.

The Kenney System
FOR FLUSHING WATER CLOSETS

The only system that will operate successfully at all times one or any number of closets under the varying conditions of water pressures. NO NOISY AND DIRTY OVERHEAD TANKS. NO CUP LEATHERS OR SPRINGS

Endorsed by sanitary engineers and plumbers.

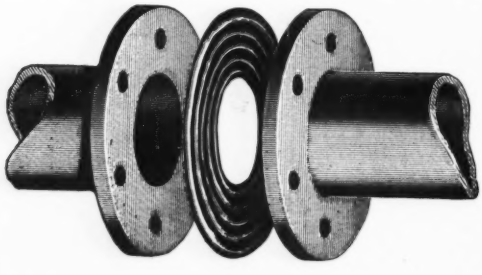
FLUSHOMETER
TRADE MARK



Patented

SEND FOR CATALOGUE AND LIST OF RECENT INSTALLATIONS

THE KENNEY CO., 72-74 Trinity Place, NEW YORK



OUR PATENTED

MINERAL WOOL PIPE COVERING AND COPPER GASKETS

THEY SAVE STEAM AND MAKE ABSOLUTELY TIGHT JOINTS

BEST AND CHEAPEST
SAMPLES FREE

UNITED STATES MINERAL WOOL CO.
143 Liberty Street, NEW YORK.

THOMSON

Meter Company

79 Washington St., Brooklyn, N. Y.

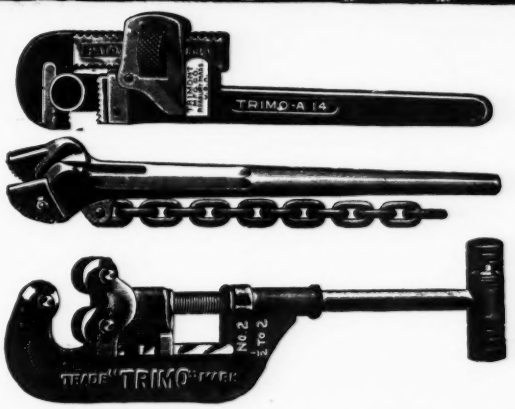
25,145 Water Meters sold in 1899.

26,414 Water Meters sold from January 1st, 1900, to January 1st, 1901.

176,717 Water Meters sold to January 1st, 1901.

We Stamp our Meters only as they are sold.

TRIMO PIPE TOOLS



All these tools are drop forged from steel. No others made so strong and durable. No expense spared to make the **best.** Give them a trial and be convinced.

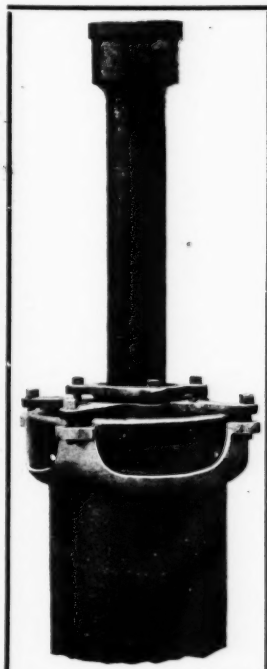
Trimo Pipe Cutter Is convertible from a single wheel with rolls, into a three-wheel cutter, by substituting the two extra cutting wheels that accompany each tool, to be found in the handle, which is provided with a receptacle for same (see cut).

TRIMONT MFG. CO.

SOLD BY ALL JOBBERS. ROXBURY, MASS.

THE MAN
WHO ADVERTISES IN THE WEEKLY EDITION OF
"DOMESTIC ENGINEERING"
CAN BE COMPARED TO THE SLOW GOING TRADESMAN, AS WE COMPARE THE TRAVELERS IN THE

HE
USES THE MEDIUM THAT IS ABREAST OF THE TIMES AND
"GETS THERE"
BEFORE THE NON ADVERTISER
GETS FAIRLY STARTED.
— GET OUR PRICES —



Application of the Hygienic Combination

Sewer Connection AND Cleanout

A practical device to join soil pipe stacks with house drains, or to attach cleanouts to clay pipe; so as absolutely to prevent ingress of sewer air, sewer leakage or back water, and at the same time secure flexibility at the joint so that settlement of house or soil pipe will not break the connection.

Fully described in a beautifully printed Circular sent free

Geo. F. Ryan & Co.

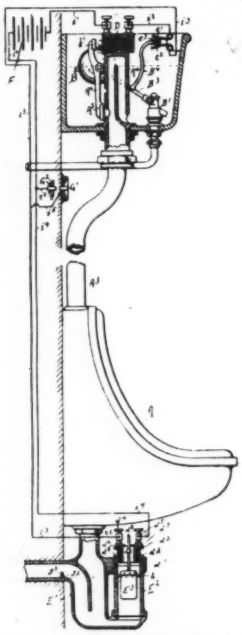
3811 Cottage Grove Ave., Chicago, Ill.

Telephone "Oakland" 528

PATENTS AND INVENTIONS

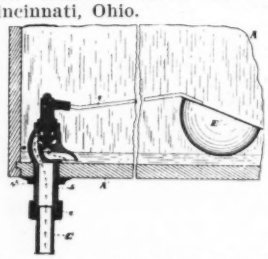
The cuts illustrating patents and inventions in this department of Domestic Engineering are furnished by Oscar A. Michel, Solicitor and Registered Attorney for American and foreign patents, at 302 Broadway, New York City. Anybody desirous of having a patent or invention illustrated will please correspond with Mr. Michel regarding it.

669,037. Automatic Flushing-Tank. John W. Stevens, St. Paul, Minn.

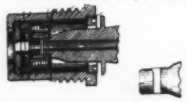


669,070. Portable bath-tub. Emilie Breide, Cape Girardeau, Mo.

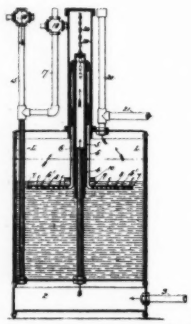
669,146. Ball-cock valve. John Porteous, Cincinnati, Ohio.



669,196. Valve. Manley J. Chaplin and Emil Falk, San Francisco, Cal.

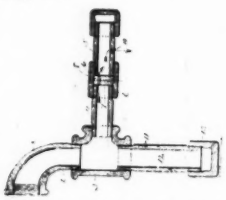


669,157. Carbureter. Roy F. Carter and Richard W. Zeirlein, St. Louis, Mo.

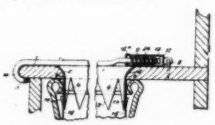


669,189. Incandescent gas-burner. Appius C. Swain, San Francisco, Cal.

669,193. Device for Supplying Water to Flush Tanks. William A. Alexander, Wilkinsburg, Pa.

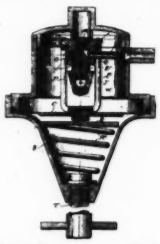


669,215. Cover for Seats of Closets. Donald Grant and Alexander Macpherson, Wellington, New Zealand.



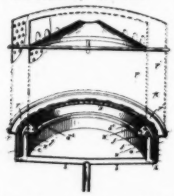
669,481. Stop and Waste Cock. William Holz, Buffalo, N. Y.

669,194. Pressure-Regulating Valve. Charles L. Bastian, Chicago, Ill.

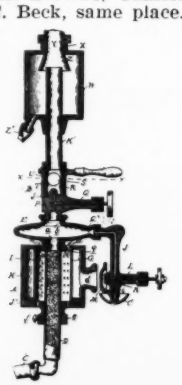


669,302. Gas-Burner. John Franklin, Norwood, Ohio.

669,303. Hydrocarbon-Burner. Frank P. Glazier, Chelsea, Mich.



669,309. Carbureter. Oscar A. Lane and Hudson A. Davenport, Adrian, Mich., assignors of two-thirds, by direct and mesne assignments, to William M. Carleton, Louis A. Browne, Charles M. Egan and Fred C. Beck, same place.



PATENT ATTORNEYS.

DYER, EDMONDS & DYER

PATENTS

31 Nassau Street New York City

have done all my patent soliciting work for this and foreign countries continuously since 1882

Thomas A Edison

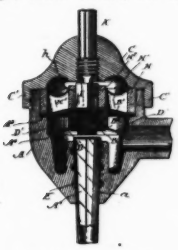
TOWNSEND & DECKER

Patent Attorneys

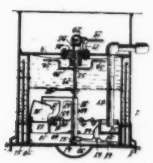
141 BROADWAY, NEW YORK

H. C. TOWNSEND, formerly Prin. Ex'r.
D. H. DECKER, late Ass't Ex'r, U. S. Pat. Office.

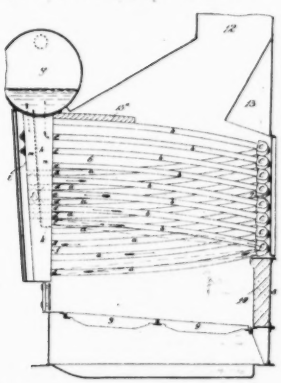
669,328. Stop-Cock. Felix Staedeli and Gustav Vogt, New York, N. Y.



669,380. Acetylene-Gas Generator. Thomas A. Bryan, Baltimore, Md.

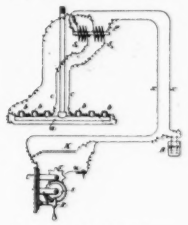


669,562. Water-Tube Boiler. John E. Thornycroft, Chiswick, England.



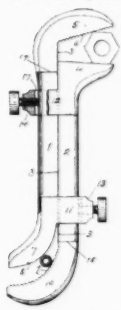
669,719. Water-Supply System. John F. Barker, Springfield, Mass.

669,543. Electric Gas-Igniter. Oscar von Morstein, Berlin, Germany.



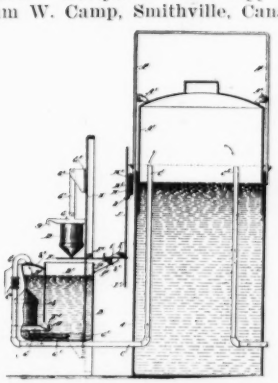
669,649. Valve Mechanism. Henry C. Meyer, Jr., Montclair, N. J., assignor to The Meyer-Sniffen Company, Limited, New York, N. Y.

669,672. Pipe-Wrench. William E. Williams, Adrian, Mo., assignor of one-half to A. J. Erhart, same place.



669,673. Pipe-Coupling. Theodore Averbeck, Cincinnati, Ohio.

669,741. Acetylene Gas Apparatus. William W. Camp, Smithville, Canada.



W. T. FITZGERALD & CO.
PATENT LAWYERS
Cor. 8th and F. Streets, WASHINGTON, D. C.

S. S. SUGAR
SOLICITOR OF UNITED STATES AND FOREIGN
PATENTS
Designs, Caveats, Trade Marks, Copyrights, Etc.
PROMPT AND EXPERT SERVICE
CORRESPONDENCE INVITED
189 BROADWAY
NEW YORK

OVER 15 YEARS EXPERIENCE.

PATENTS

TRADE MARKS, DESIGNS
COPYRIGHTS
DOMESTIC AND FOREIGN
Procured at Moderate Rates.

Book on patents sent free. Patents obtained through

OSCAR A. MICHEL
Registered Attorney,

will be fully illustrated free, in the following . . . .

TRADE JOURNALS:

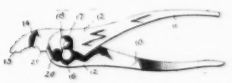
Electricity, Weekly: American Silk Journal, Housefurnishers, China, Glass and Pottery Review, Monthly.

These have the largest circulation among the capitalists and manufacturers. Handsomely illustrated and covering a wide field, embracing mechanics, electricity, engineering, silk industries, housefurnishings and miscellaneous subjects.

SAMPLE COPIES SENT FREE BY ADDRESSING DEPARTMENT 33.

OSCAR A. MICHEL
302 BROADWAY, NEW YORK.

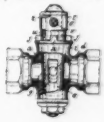
669,721. Pliers or Pipe-Tongs. Walter H. Bruce, Worcester, Mass., assignor to the Billings & Spencer Co., Hartford, Conn.



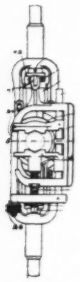
669,742. Wrench. Albert Dudly, Menominee, Mich.

669,815. Stop and Waste Cock. Delbert E. Trahern, Rockford, Ill.

669,817. Stop and Waste Cock. Sylvester J. Asbell, Paterson, N. J.

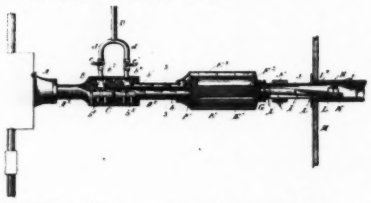


669,874. Cutting-Off Tool. Charles T. Birchard, Melrose, Mass., and George R. Campbell, Ellsworth, Me.; said Campbell assignor to said Birchard.



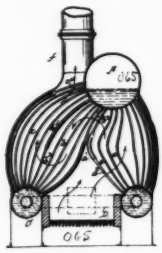
669,880. Gage-Cock. Hart Harris, Washington, Pa., assignor of one-half to Robert Lowe, same place.

669,983—Pipe-Cutting Tool. Otto H. Ewest, Jersey City, N. J.

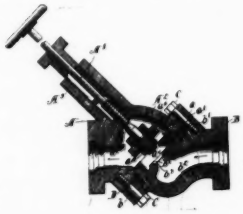


670,013—Hydrocarbon Incandescent Lamp. Frederick A. Cody and Robert D. Cody, Chicago, Ill.

670,065—Water-Tube Boiler. Ricard Schulz, Berlin, Germany.



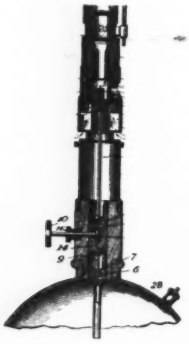
670,083—Valve. Eugene F. Osborne, Chicago, Ill., assignor to the Osborne Steam Engineering Company, same place.



We are making a specialty of fine China articles for metal mountings. Scalp marks and China handles of every description. Samples furnished on application.

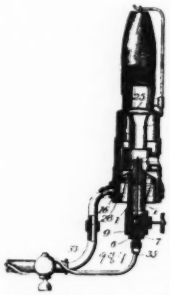
THOMAS MADDOCK & SONS,
TRENTON, N. J.

669,987—Apparatus for the Production of Vapor from Oils. Albert Hayes, Salt Lake City, Utah., assignor, by mesne assignments, to the New Light, Heat & Power Co., of Utah.



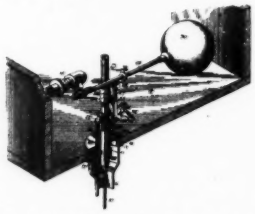
670,074—System of Sewer Ventilation and Disinfection. George P. Heilman, Evansville, Ind.

669,989—Combined Gas and Vapor Burner. Albert Hayes, Salt Lake City, Utah, assignor, by mesne assignments, to the New Light, Heat & Power Co., of Utah.

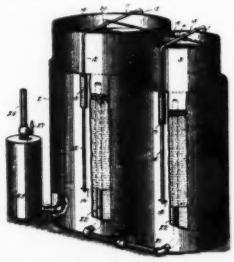


670,111—Steam-Radiator. Chas. Phelps, Oskaloosa, Iowa.

669,990—Water-Closet Flushing Apparatus. Henry Haynes, Philadelphia, Pa., assignor of two-thirds to David W. Davies and David M. Reilley, Scranton, Pa.



670,101—Acetylene-Gas Generator. Geo. L. Elkins, Wharton, Tex.



BATHS

OUR PORCELAIN LINED BATHS

cannot be excelled by those of any maker in the world, in smoothness, brilliance, or perfection ✱ ✱ Catalogue on application

A. Weiskittel & Son
BALTIMORE, MD.

Santa Fe

Is the short line to Kansas City. Two daily trains from Chicago equipped with Pullman and Tourist Sleeping Cars. Free Reclining Chair Cars and Harvey Dining Cars. A special rate

To Kansas City

of one and one-third fare for the round trip on certificate plan will be made for the Convention of Master Plumbers Association. Trains leave Dearborn station at 6.00 and 10.00 p. m. daily. If you are going to

National Convention
Master Plumbers Association
JUNE 4 to 7, 1901

make reservations early through nearest ticket agent or

J. M. CONNELL, Gen. Pass'g'r Agt., A. T. & S. F. Ry.
109 Adams St., Chicago.

New Catalogue Now Ready

DESCRIBING OUR

"Paragon" Self-Closing and Fuller Work

THE MOST COMPLETE BOOK BEFORE THE TRADE. HAVE YOU ONE?

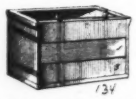
THE SANITARY COMPANY

Successors to
The C. F. HUNGER CO. and the WELKER-LUTHER CO.

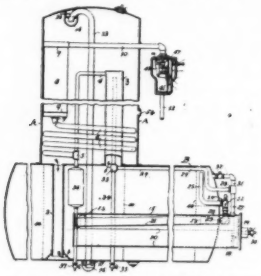
MANUFACTURERS OF
PLUMBERS' BRASS GOODS

CLEVELAND, O.

670,134—Tank. William Heap, Muskegon, Mich.

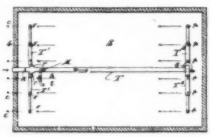


670,196—Acetylene-Gas Generator. Edmond R. Cook, Sacramento, Cal.

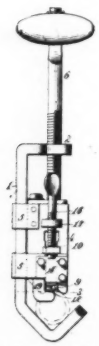


670,236—Drain or Sewer Pipe. John W. Kelly, New Brighton, Pa.

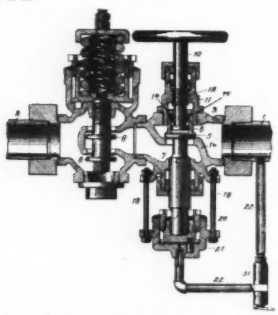
670,237—Means for Humidifying the Air of Rooms. Paul Kestner, Lille, France.



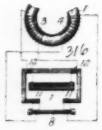
669,866. Pipe Trimming and Tapering Tool. George Thomas, Kuttawa, Ky., assignor of one-half to William Ellis Peay, same place.



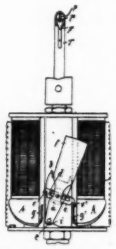
670,250—Cut-Off. Raphael Ryan, Pittsburg, Pa.



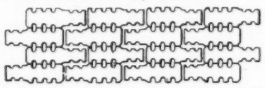
670,316—Incandescent Lamp. Reginald A. Fessenden, Allegheny, Pa.



670,252—Igniting Device. Ernest Schmidt, Wilmersdorf, Germany.



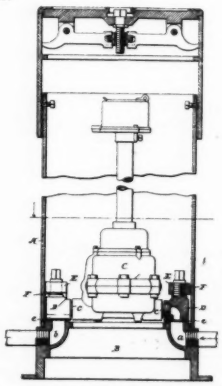
670,257—Chain-Grate Furnace. Frank R. Tibbitts, Cleveland, Ohio.



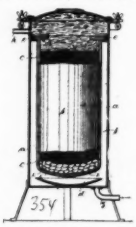
670,330—Steam-Inlet Valve. Francis Schumann, Philadelphia, Pa.

670,332—Self-Lighting Gas-Burner. Angelo Simonini, Brooklyn, N. Y.

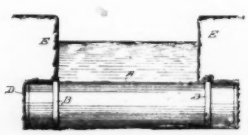
670,335—Meter-Box. James A. Tilden, Hyde Park, and Henry D. Winton, Wellesley Hills, Mass., assignors to the Hersey Manufacturing Company, South Boston, Mass.



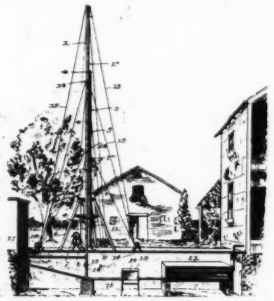
670,354—Acetylene-Purifying Composition. Georg Dollner, Rixdorf, Germany.



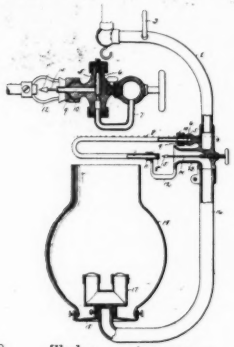
670,778. Construction of tunnels for sewers, etc. Ossian Guthrie, Chicago, Ill.



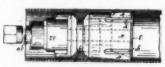
670,443. Ventilating apparatus. William E. Vernon, San Angelo, Tex.



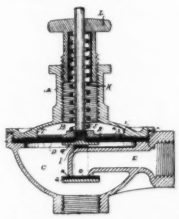
670,484. Gasoline lamp. George Ruppel, New Orleans, La.



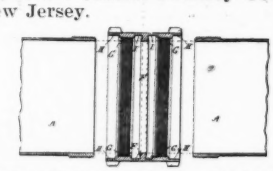
670,528. Tube stopper. Edward Blamey, Jersey City, N. J.



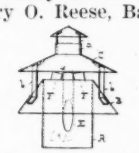
670,539. Pressure regulator. James B. Erwin, Milwaukee, Wis.



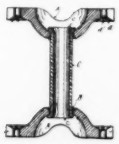
670,584. Pipe and pipe coupling. Alfred Fowle, Jr., New York, N. Y., assignor to the Central Foundry Company, of New Jersey.



670,682. Chimney Cowl. Ezekiel Mills, Jr. and Henry O. Reese, Baltimore, Md.



670,870. Pipe hanger. Julius R. Drozeski, Erie, Pa., assignor of one-half to Ray Himrod, same place.



Texas Plumbers Must Toe the Mark.

San Antonio, Tex., April 28.—(From a Staff Correspondent.)—I am sending you herewith a copy of the working rules of the local plumbers' union No. 142. Pretty stiff, are they not? The M. P.'s here are doing a very good business and are on the whole prosperous. We have just elected new local officers, W. G. Shuwirth being our new president, J. Bowman vice-president, Ed. Braden secretary-treasurer, and Rud. Strohmeyer sergeant-at-arms. Following is the text of the rules referred to:

Working Rules of the Local Union No. 142, San Antonio, Tex.

No member of this union shall use an apprentice or helper on any work in the plumbing line, under a penalty of $5.00 fine. Each and every day a separate offense.

No member shall use a laborer for any other purpose than for digging trenches, laying sewer and mixing cement, and lifting on heavy work, where more than one man is required, and in no case shall a laborer use plumbing tools. Penalty, $5.00 for first offense, and expulsion for second.

No member shall begin work before 8 o'clock, and any one found working during the noon hour, unless necessary occasion requires it shall be fined $5.00 for each offense; every day shall be a different offense.

Any member found intoxicated while at work for a master plumber shall, upon complaint, be fined $3.00.

No member is allowed to use any vehicle for hauling material, except it be the property of the employer. Penalty, $5.00 for each offense.

No plumbing work shall be done by any member faster than one day and one-half to one fixture. Fine, $5.00 for each offense; each day a separate offense.

Any member who willfully reports to the employer any action, or faulty work, or in any manner makes remarks injurious to a brother-member's interests, shall be fined $5.00 for each offense, or upon a two-thirds vote be expelled.

Any master plumber who refuses to put to work any member when he needs plumbers, on account of prejudice, shall be declared unfair at once, and all members shall refuse to work for him, under penalty of $5.00.

No member shall work more than eight hours any day for any employer when there are brother members out of employment or idle. A fine of $5.00 for each offense; once in every day is a separate offense.

No member shall have an apprentice, or helper or laborer, to help him on any job after the heavy work is done, nor shall he have an apprentice, helper or laborer to keep his metal hot during noon hour under any circumstances. Violation, $5.00 for first, expulsion for the second offense.

An Electric Novelty.

Some of the electrical companies have placed in stock a new electric novelty. It is a gold-plated locket with a small electric bulb, which throws a brilliant light by simply pressing the fingers together in the pocket.

Art in Advertising.

The United States Heater Company, of Detroit, Mich., is advertising itself and incidentally the beautiful City of the Straits by sending out art postals showing some of the chief places of beauty and interest about the city. These postals certainly command attention and are not likely to be tossed aside carelessly.

L. J. Mueller's Furnace Catalogue.

The L. J. Mueller Furnace Co., Milwaukee, Wis., announce that their new catalogue is now ready for distribution.

Working on Catalogue.

Behrer & Co., plumbers' supplies, 81 Beekman street, New York city, are hard at work on a new catalogue. It will be ready for the printer in the course of several weeks. Their removal to their present quarters has caused some delay in getting out the catalogue. But now they are about settled in their new store

Busy Making Preparations.

The Sanitary Supply Co., who recently launched out in the jobbing trade in Grand Rapids, Mich., write us that they have ordered bath tubs, marble sinks, range boilers, soil pipe and soil pipe fittings, some steam fitters' tools, wrought iron pipe, and are making specifications for steam and plumbing brass work, malleable and cast iron fittings, earthenware, tanks and seats, and all other products that enter into a first-class jobbing house for plumbing and steam supplies. They will confine themselves for the present to L. Wolf Mfg. Co.'s catalogue on plumbing goods and to Crane Co.'s catalogue on steam goods until such time as they can get out printed matter of their own.

A Letter Commendatory.

The Buffalo Forge Company, of Buffalo, N. Y., are in receipt of a letter from the Elmira Water, Light and Railroad Company, which is self-explanatory. The apparatus referred to is a Buffalo Standard 80-inch steel plate fan with direct connected 5x5 Buffalo single vertical engine, serving two 250 h. p. boilers. The letter follows:

"In reply to yours of the 2nd inst. will say that we are very much pleased with your direct connected fan outfit for forced draft purposes at our lighting plant. Our saving on the first month's run with this apparatus in use, amounted to 175,000 lbs. of coal, and on the test for increasing the capacity of our boilers, we found that with a fan, one 250 h. p. water tube boiler developed on a continuous run of ten hours, a little over 600 h. p., and while we do not advocate forcing the boilers to any such extent, it simply shows what can be done in this line in case of necessity.—(Signed) A. E. Walden, superintendent."

New Incandescent Lamp in Norway.

Under date of February 23, 1901, Consul-General Guenther, of Frankfort, says, in his report to the Bureau of Foreign Commerce, Department of State:

It is reported that Ch. Petersen, of Christiania, has constructed a new incandescent lamp, which is of interest on account of its peculiar arrangement. For the radiation of light, a conductor of the second class, which conducts electricity only when heated, is used, the same as in the "Nerst" lamp. The conductor in this new lamp, however, is not a thread, but a small rod, which is brought to a white heat and thereby emits light. Around this "second-class" conductor a thin metal wire of good conductivity is wound, which is connected wtih the current conductor by equalizing resisters, which serve the purpose of heating the second-class conductor and increasing the resistance of the current. The second-class conductor takes up the greater part of the current. This arrangement results in a great saving of the electric power, which about equals that of a Nerst lamp, but yields a considerably stronger light.

Small Bros., Denver, Colo., are using Cooper's Nautilus closets in some work they have on hand.—Adv.

The Duffy "No-Flud" Back Water Stop

STOPS THE WATER BACKING UP through basement and Area Drains and prevents foul gases arising from the sewer. No Erratic Rubber Balls or swinging metal Gates which are unseated by Sediment, Paper or Matches.

IT NEVER DISAPPOINTS

For Sale by the plumbing trade generally. Made by

E. S. DUFFY MANUFACTURING CO.

Not Incorporated. 6438 Wentworth Ave., Chicago

INVENTION FOR SALE

ALTPETER'S ALUMINUM SOLDER

Hard and Soft Solder, also a process to solder copper, brass and other metals to aluminum

Samples shown. No solder for sale

758 S. Halsted St. CHICAGO

L. F. ALTPETER, JEWELER

NOTICE

All QUOTATIONS and PRICE LISTS for Italian, Knoxville and American

MARBLE

have been withdrawn.

Rutland Marble Mfg. Co.

Rutland, Vt., April 30 1901.

AMERICA'S MOST POPULAR RAILWAY

CHICAGO AND ALTON

PERFECT PASSENGER SERVICE

BETWEEN

CHICAGO AND KANSAS CITY,
CHICAGO AND ST. LOUIS,
CHICAGO AND PEORIA,
ST. LOUIS AND KANSAS CITY.

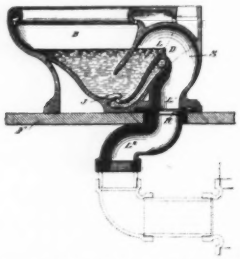
THROUGH PULLMAN SERVICE BETWEEN CHICAGO AND

HOT SPRINGS, Ark., DENVER, Colo.,
TEXAS, FLORIDA, UTAH,
CALIFORNIA AND OREGON.

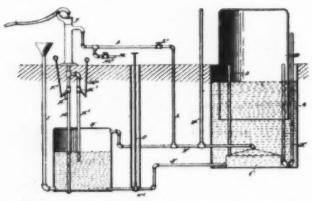
IF YOU ARE CONTEMPLATING A TRIP, ANY PORTION OF WHICH CAN BE MADE OVER THE CHICAGO & ALTON, IT WILL PAY YOU TO WRITE TO THE UNDERSIGNED FOR RATES, MAPS, TIME-TABLES, ETC.

GEO. J. CHARLTON,
GENERAL PASSENGER AGENT,
CHICAGO, ILL.

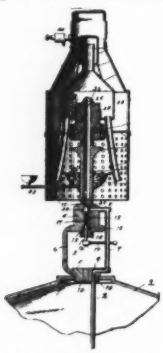
670,588. Siphon Water Closet. Winfield E. Hinsdale, New York, N. Y.



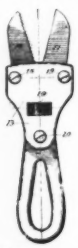
670,599. Carbureter. Charles Tenney, Mason City, Iowa.



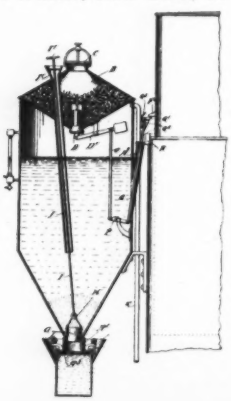
670,630. Hydrocarbon incandescent lamp. Philip Curran, Philadelphia, Pa.



670,681. Adjustable pipe and nut wrench. Henry J. Martin, Chicago, Ill., assignor to the Whitman and Barnes Manufacturing Co., Akron, Ohio.

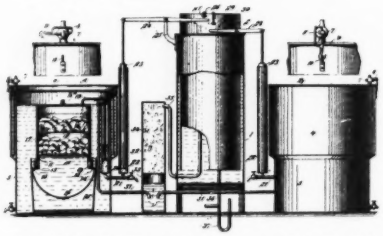


670,696. Acetylene gas generator. Jacob H. Willers, New York, N. Y.

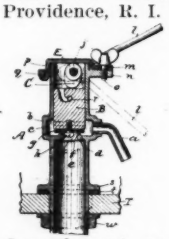


670,794. Valve. John B. Lott, Anderson, Ind.

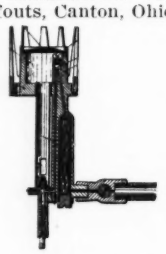
670,815. Acetylene gas generator. Wilson G. Ross, Benicia, Cal.



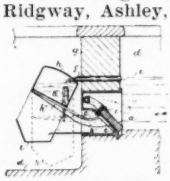
670,818. Ball cock. James M. Smith, Olneyville, Providence, R. I.



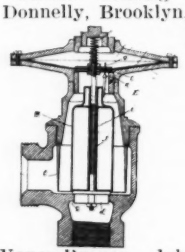
670,887. Incandescent vapor burner. Leroy S. Pfouts, Canton, Ohio.



670,888. Self-flushing time valve. George E. Ridgway, Ashley, England.



670,893. Steam heating apparatus. James A. Donnelly, Brooklyn, N. Y.



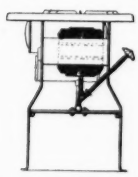
34,172. Vapor-Burner. John E. Lambert, Detroit, Mich.

34,209. Burner for Gas Lamps. Alfred H. Humphrey, Kalamazoo, Mich.

34,210. Hydrocarbon Burner. William R. Jeavons, Cleveland, Ohio.

34,250—Gas-Burner or Similar Article. Lee T. Alton, Brooklyn, N. Y.

34,251—Hydrocarbon-Stove. William R. Jeavons, Cleveland, Ohio.



34,281. Pipe-main fitting. Charles Phelps, Oskaloosa, Iowa.

LIQUID AIR AND LOW-GRADE FUELS.

The London Engineer speaks of a remarkable use of liquid air through the invention of a German engineer, Mr. Hempel.

He utilized the fact that in the evaporation of liquid air, nitrogen evaporates more rapidly than oxygen, so that finally a gas remains containing a high percentage of the latter element. Mr. Hempel tried to make use of this in firing with low-grade fuel, like brown coal and peat, and for that purpose constructed a peculiar furnace.

At some distance from the firing room a vessel containing liquid air is placed, the contents of which naturally evaporate gradually. The first gases, rich in nitrogen and thereby impeding the process of the burning of the fuel, are allowed to escape; the later gases however, consisting of 50 per cent of oxygen, are led under the grate and cause a lively fire.

Quick Water Heaters

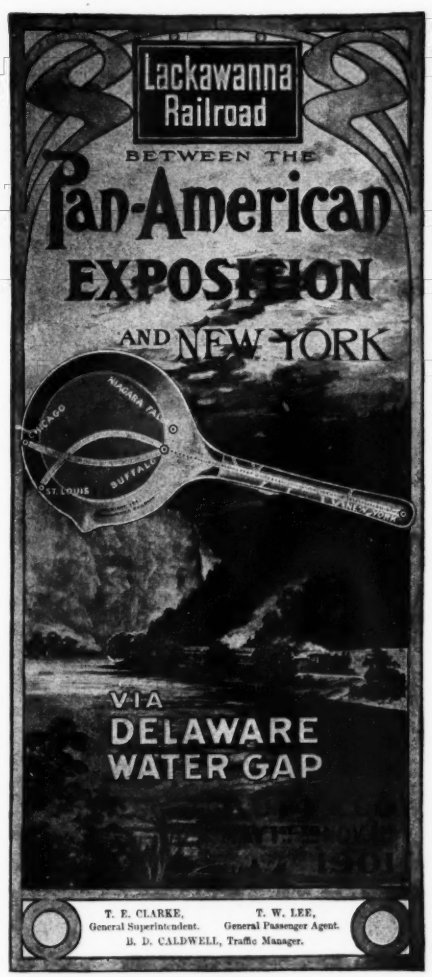
Not Quite Instantaneous

Price, $12.00 to $18.00

Large size has 8 square ft. heating surface

J. S. EMERY

1114 S. 15th Street TOLEDO, OHIO



This is a reproduction of the cover of a complete guide to the Pan-American Exposition just issued by the LACKAWANNA RAILROAD. It will be mailed to any address on application, accompanied by four cents in stamps, to

T. W. LEE,
General Passenger Agent,
26 Exchange Place,
NEW YORK CITY.

OAKUM PACKING AND ROPE

Planet Mills Mfg. Co.

335 Carroll St. BROOKLYN, N. Y.

"TOTAL ECLIPSE"

Hydrants and Street Washers

The cheapest and most durable on the market.

Guaranteed to give entire satisfaction

We also make all styles of "McNAMARA" PATTERN HYDRANTS

Carried in stock by all Jobbers

WRITE YOUR DEALER FOR PRICES

JOHN G. KUPFERLE
ST. LOUIS

SCAIFE'S
Galvanized Iron Range Boilers.

Brazed Seams, Thoroughly Tested, Always Reliable.

Heavier, Stronger, More Durable Than Any Others.

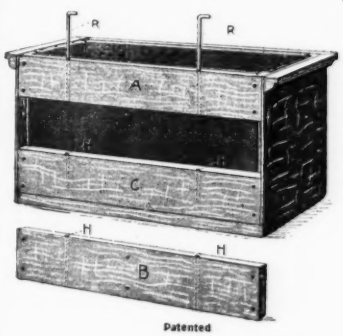
Localities having Severe Pressures should use only the SCAIFE BOILERS; they cost no more than others. Hundreds set in place over twenty years ago are still in use.
Complete Catalogue Mailed Upon Application.

WM. B. SCAIFE & SONS,
(Established 1802)
PITTSBURGH, PA.

DOMESTIC ENGINEERING
THE LEADING JOURNAL OF ITS CLASS

A New Tank for the 20th Century

THE "EASY PUT UP"
(PATENTED)



Patented

NO BRACKETS TO RUST.
SAVES TIME & LABOR.
MORE SECURE WHEN UP.
EASILY & QUICKLY TAKEN DOWN.

For descriptive Circular and Prices address

William Heap, Plumbers' Woodwork Manufacturer,
MUSKEGON, MICH.

JUST WHAT THE PLUMBER IS LOOKING FOR.

TO MASTER PLUMBERS:

If your Jobber does not handle this Tank, drop us a postal card and we will tell you who does.

Leighton, Davenport & Co., Bar Harbor, Me., are using three of Cooper's Reno closets in a fine operation they have on hand in that city.—Adv.

THE OTIS FEED WATER HEATER.

This is a tubular feed water heater and purifier with seamless brass tubes and the Stewart Heater Co., 225 Norfolk avenue, Buffalo, N. Y., guarantee it to heat feed water to the boiling point with exhaust steam without back pressure. They also guarantee it to extract the oil from the exhaust so that the exhaust steam

after being passed through the heater, can be used for heating purposes and the water of condensation from the heating system be returned to the boilers without the extra expense of an eliminator. They make a proposition that if the heater fails to give satisfaction in every respect, they will pay freight, cartage and all expenses, the heater to be returned to them. Certainly, nothing can be fairer than this.

E. D. Hornbrook, Kansas City, Mo., recently placed one of Cooper's Nautilus closets in a fine residence in that city.—Adv.

ECLIPSE BACK PRESSURE VALVE.

This valve is made by the John Davis Co., Chicago, Ill. It is a two-seat valve, provided with an air cushion which prevents any hammering and makes it a noiseless valve. It can be used on either a horizontal or vertical pipe. Upon application, mentioning "Domestic Engineering," circulars and price of this valve will be sent.

John C. Gunzer, Chestnut Hill, is plumbing the residence of Mr. Samuel Goodman, using Cooper's Nautilus closets, baths, etc.—Adv.

VERY ATTRACTIVE.

The Homer Brass Works of Philadelphia are having a fine run on their new faucet, the Apex, and have recently gotten out some very attractive cards to be hung in plumbing establishments which they will be pleased to send to all requesting same. The Apex is constructed on entirely new principles with no top jackings, washers, small nuts or parts to mar or replace. They operate with the lightest touch and are impervious to hot or cold water. They never leak and will soon find their way into every city in the United States and Canada.

THEY RECOGNIZE IT.

Blake & Andros, 42 Oliver street, Boston, Mass., recently began to advertise more largely in our weekly edition, and under date of April 10th they write us: "We are happy to tell you that 'Domestic Engineering,' weekly edition, seems to be very thoroughly read everywhere, as we are receiving replies referring to the list of New York jobbers as published in yours of the first."

Clarence S. Thompson, Atlantic City, N. J., has some nice work on hand at the residence of Mr. Burkhart in which he is using Cooper's goods.—Adv.

INCREASING SUCCESS.

The Hayes Manufacturing Company, makers of the "Wilhelmi" patent safety copper range boiler, and the "Modern" copper pressure boiler, are meeting with the success which is sure to be the portion of a firm that manufacturers a thoroughly reliable article and properly advertises it. Their sales for this year have considerably exceeded those of any similar period in the company's history, and they are now compelled to run overtime to keep up with their orders. The 250-lb. test Wilhelmi is absolutely guaranteed to stand a working pressure of 150 lbs.

The material used is the best lake copper exclusively, which in the process of rolling acquires a density and hardness akin to that of steel. Every boiler is reinforced internally with six corrugated rings or ribs of brass, which add enormously to its strength and renders collapse an absolute impossibility. The point of connection of the head and shell in most boilers is conceded to be the seat of weakness, whereas in the Wilhelmi it is distinctly the strongest. As shown by sectional cut the peculiar double compensating hook-seam offers powers of re-

sistance in excess of any other part of the boiler, while the utter absence of rivets removes another fruitful source of structural trouble. The Wilhelmi Boiler is heavily tinned on the inside, while the outside is so beautifully polished as to render it a distinctly ornamental addition to any kitchen or laundry.

The 250-lb. test is their highest grade boiler, and there is no better article of its class in the market. The 150-lb. test, apart from the somewhat lighter copper used, is identical with the 250-lb. test.

Where the pressure does not exceed 100 lbs. the "Modern" boiler is the peer of any. It is tested to 200 lbs. and guaranteed against collapse and to stand an actual working pressure of 100 lbs. The Hayes Mfg. Co.'s guarantee is one that means what it says, and if by any means a weakness should develop in a boiler a new one will be promptly forwarded from the factory to replace it.

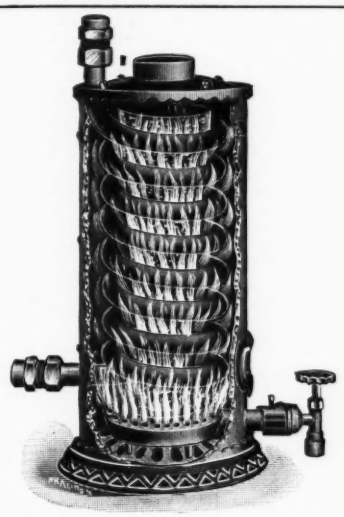
Full descriptive matter and price lists can be had on application by mail to the company's Paterson office.

Wells, Newton Co., Boston, are plumbing a fine residence, using five of Cooper's Nautilus closets.—Adv.

FANS WATER FANS FOR DESK AND WALL ONLY

ELECTRIC FANS
FOR CEILING, DESK, WALL OR COLUMN
ANY VOLTAGE

SEND FOR CATALOGUE AND PRICES TO D. L. BATES & BROTHER, Dayton, Ohio



SEND FOR CATALOG

LAWSON'S
GAS - - WATER
HEATER

PRICES WILL SUPRISE YOU

L. S. LAWSON

222 Eighth Avenue, Homestead, Pa.

McVAY & WALKER.

Manufacturers of

Enameled Tubs.

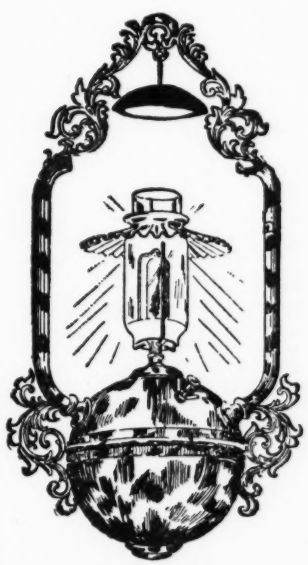
WILL GLADLY SEND PRICES ON THE TWO BEST TUBS MADE.

Write Today. *Unique and Eureka* Prices will surprise you.

BRADDOCK, PA.

The Lamp of Lamps

Sent on approval to the Trade.



500-Candle-power air-pressure "Search-Light" Vapor Lamp, costing One-Tenth of Electricity; also 100 candle power lamps in various styles.

GET CATALOGUE

Search-Light Mfg. Company

358 Dearborn St., Chicago, Illinois.

GET THE LATEST

and best Low Down Closet Combination on the market

The Adonis

Write for advance sheets showing

FINE BATH ROOM FIXTURES
AND SANITARY SPECIALTIES

Manufactured by

The Western Brass Mfg. Co.

615-617 Walnut Street, ST. LOUIS, Mo.

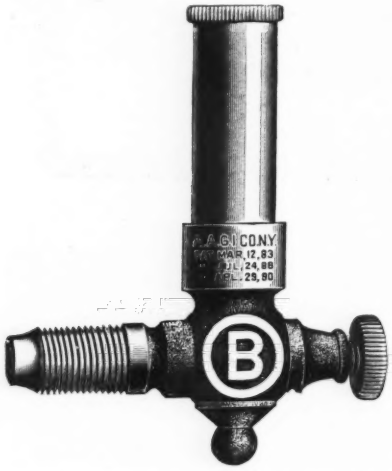
To Light the West.

The Kern Incandescent Gas Light Co., of 18 Murray street, New York, have opened a house in Chicago, at 76 Jackson boulevard, where they will display a full line of the marvelous Kern burners. Those who have never seen this beautiful and brilliant light should not fail to visit Chicago headquarters and see it in operation.

Thos. B. Pierson, Morristown, N. J., has some work on hand in which he is using Cooper's goods.—Adv.

The Bundy Automatic Air Valve.

We show herewith several styles of the "Bundy" automatic air valve, made by the A. A. Griffing Iron Co., of Jersey City, N. J. The first cut shown is of the

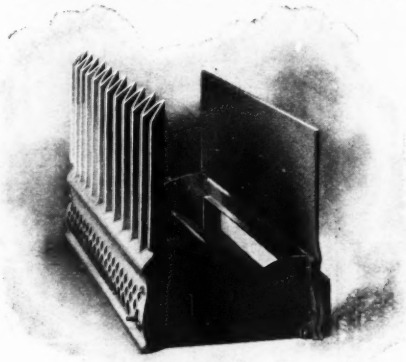


style "A" combined automatic and positive air valve. The second cut shown is a steam valve with an evaporation cup. This valve is furnished without an evap-

oration cup when a drip pipe is to be connected to it. Other steam specialties manufactured by this firm are shown in their printed matter, which will be sent upon application if you write, mentioning "Domestic Engineering."

An Indirect Radiator Base.

J. L. Mott Iron Works, Heating Department, 84-90 Beekman street, New York City, manufacture direct-indirect radiator bases. As will be seen from an examination of the illustration, the cor-



rugated front fits closely into the openings between the radiator loops and extends sufficiently high on the front to deflect the air entering the base of the radiator, at the rear, upward through the entire length of the radiator, thus discharging it at the top of the radiator heated as high as it may be. The valve opening or closing is operated by a very ingenious device which is positive in its action.

Currie Hardware Co., of Atlantic City, N. J., recently plumbed the Blumenthal Building, using Cooper's goods throughout.—Adv.

Jenkins Brothers' 1901 Catalogue.

The Jenkins Brothers' 1901 catalogue of valves, discs and packing is rapidly finding its way to users and jobbers of such articles all over the United States. If there are any not yet supplied they should write immediately. The supply will not last always.

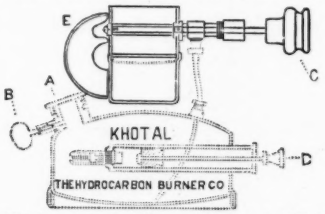
Jenkins Brothers make two offers in their 1901 catalogues that are of interest to users or prospective buyers of their goods. In regard to their valves they say: "If you will put a Jenkins Brothers' valve on the worst place you can find, where you cannot keep other valves tight, and if it is not perfectly tight, or does not hold steam, oils, acids, water, or other fluids, you may return it, and your money will be refunded."

Second offer: "Use the Jenkins Standard '96 packing on the worst joint you have, if it is not as we represent it we will refund the money."

Thos. Costello, Plattsburg, N. Y., is adding nine more Cooper's Nautilus closets to the equipment of a large hotel in that city.—Adv.

A New Wickless Oil Burner.

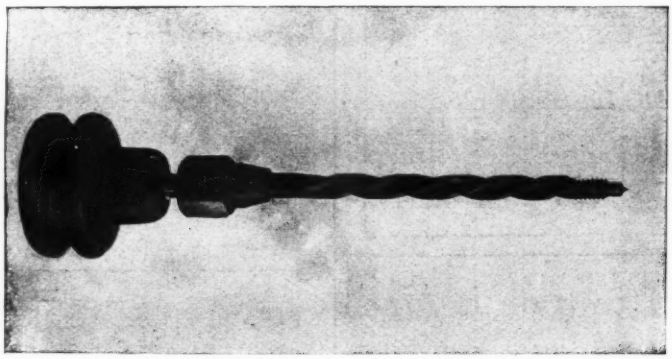
We have the pleasure this week of giving space to an article about a new wickless oil burner that, from reports, promises to hold its own with all competitors. It is the Khotal, and is manufactured by



the Hydrocarbon Burner Co., of 197 Fulton street, New York City.

From the cuts a general idea of the burner can be had. This new burner is on the principle of converting kerosene into vapor and consuming it with a mixture of air.

The augur-like stem by which the flow of oil is controlled is the secret of the success of the Khotal lamp. Heretofore, in similar lamps, the pipe through which the oil flows to the burner has become corroded and full of dirt. With the augur-

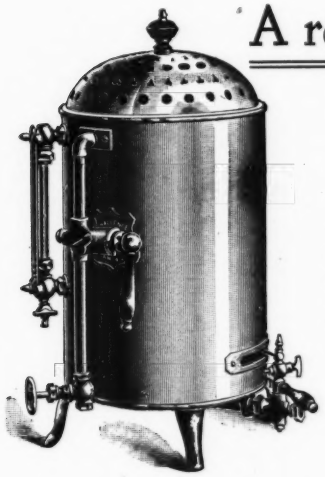


like stem of this new lamp, however, the oil pipe to the burner is kept perfectly clean. Every turn of the stem catches any particles of dirt that might be in the pipe, forcing them along towards the burner until they are finally forced clear out of the pipe. A glance at the cut will show how easily the stem will do its work.

The pump which forces the oil into the burner can be so regulated that a flame can be obtained, varying from a consumption of 35 feet of gas per hour to 1 foot per hour.

By the use of a hood, it is converted into a plumber's furnace. It is just the thing for boats.

One of the Hydrocarbon company's latest orders is for thirty-two stoves to be taken on the Baldwin-Ziegler polar expedition.



A record breaker

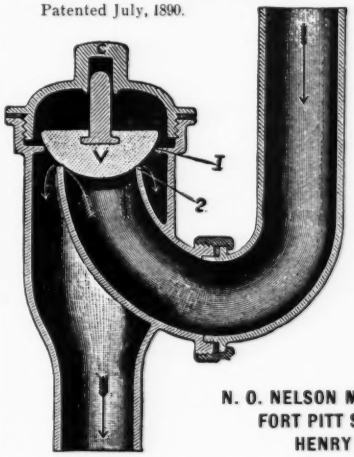
Boils water in
1½ minutes

This heater with gas attachments for heating water to a high temperature with unequalled rapidity and economy cannot be surpassed by any heater on the market. Adapted for bath rooms, etc. Send for catalog.

Challenge Mfg. Co.
South Norwalk, Conn.

THE SECURITY TRAP

Patented July, 1890.



Seal: Cannot be reduced in any degree by most severe syphonic action.

Evaporation: Ball rests in such a way that it is impossible for water to evaporate.

Back pressure: Positively safe against it.

Noise: No roaring.

GET PRICES.

WM. A. MUNDY
211 S. Ninth St.
PHILADELPHIA, PA.

N. O. NELSON MFG. CO., St. Louis, Mo.
FORT PITT SUPPLY CO., Pittsburg, Pa.
HENRY McSHANE MFG. CO., Boston.

Fig. 52

House Force Pumps

FOR KITCHEN SINK USE.

These pumps are adapted to a variety of purposes and are constructed as a compact, yet powerful hand force pump, especially intended for house use in forcing water into an upper story or storage tank. Made with polished iron, brass lined or all brass cylinder.

Fig. 53 is also furnished with brass tube cylinder, cylinder cock spout, brass piston rod, and stuffing nut highly polished and nickel plated, making one of the handsomest pumps ever put on the market.

A. Y. McDonald & Morrison Mfg. Co.

Established 1856 DUBUQUE, IOWA

Fig. 53

Here's an "Eye Catcher"

IT'S A CUT—one of the sort of illustrations we are making every day for advertisements, booklets, catalogues, etc. We make them in half-tone or line, from photographs, drawings, or direct from the articles. We have a plant and a force that give our customers great advantages in quality, time and cost.

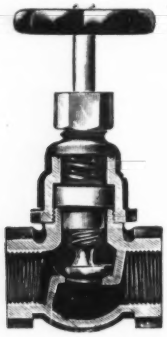
Send for Specimens and Prices.

The Standard Engraving Company
Incorporated
Seventh and Chestnut Streets, Philadelphia, Pa.

Shaw & Beairsto, Charlottetown, Prince Edward's Island, are plumbing a residence in that city, using Cooper's Nautilus closets, lavatories, etc.—Adv.

A Self-Grinding Valve.

This illustration shows the Swenson self-grinding valve as made by the Thomas Brass & Iron Works, of Waukegan, Ill. It has been thoroughly tried and



tested and has proven that it will grind itself tight and continue tight until actually worn out. It has metal discs and metal seats. It requires no replacing of discs, no regrinding, permits no leakage, and is accompanied by no expense for repairs. They are for sale by most jobbers, and are made in globe and angle patterns from ⅛ to 3 inches in size, in globe patterns 1 inch to 3 inches in size, and in cross valves, screwed, from ¼ to 3 inches. Upon application to the manufacturers, mentioning "Domestic Engineering," prices will be sent.

G. Wilbur Thompson, Newton Center, Mass., has some work on hand in which he is using Cooper's Nautilus closets, baths, etc.—Adv.

A Trade Mark Full of Meaning.

Sometimes it is worth while to examine closely the trade marks adopted by the different firms in order to study out their meanings. We show herewith the trade mark of the Sanitary Specialty Mfg. Co., 24-30 Milwaukee avenue, Chicago, Ill., which might be passed over by the careless reader without much attention being paid to it, but is full of meaning if one will examine it carefully. The anchor gives stability and security to hope and confidence; with it the cable "to tie to."

Across the body of the anchor is the word "Reliable," which means so much to every one at some time in his life. This trade mark was adopted by the company when it started in business as a declaration of its intentions toward its customers, and it is practically a guarantee of good faith on their part. They state that all goods bearing this trade mark may be understood to be all right in every respect. The company handles everything in plumbing, gas, steam and water supplies.

Bolger & Reagan, of Magnolia, Mass., are using Cooper's Nautilus closets in a fine residence they are plumbing.—Adv.

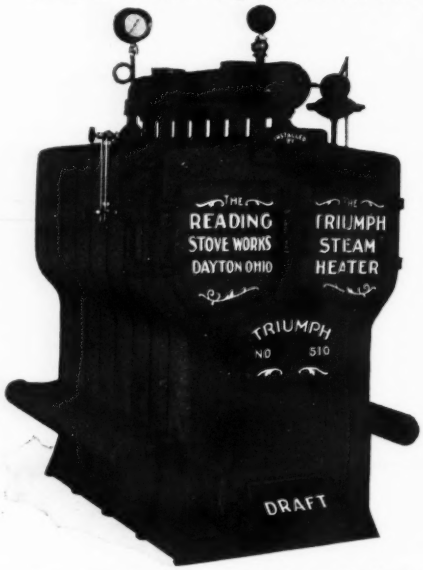
Bell Company Incorporates.

The Bell Manufacturing Co., 281-283 Water street, New York City, manufacturers of steel clad and galvanized steel enameled bath tubs, have incorporated, under the name of E. C. Bell Mfg. Co., with a capital of $75,000, of which $35,000 is paid up. The officers of the company are: Eug. C. Bell, F. J. Smith, H. R. Armstrong and Sam'l Sturtz.

Robt. W. Kyle, Wheeling, W. Va., has some nice work on hand in which he is using Cooper's Nautilus closet and other goods.—Adv.

Triumph Hot Water and Steam Heaters.

We illustrate herewith one of the Triumph steam heaters. This popular line has several peculiarities and advantages over other makes of screw nipple boilers. It is made in three widths of grate—16, 24 and 36-inch, ranging in capacity from 200 lbs. to 3,700 lbs. in steam and from 325 lbs. to 6,100 lbs. in water. In the smaller sizes the sections are made in one piece, but the larger sizes have the sections made in halves, thus insuring all castings to be of reasonable size and weight for handling and taking into any ordinary building. The headers and returns are all accurately tapped with special tools, and holes for flood and return pipes are of ample size. In each heater the heating surface is properly proportioned to the size of grate and the rat-



ings are made conservative, to allow ample margin for obtaining a boiler of proper size.

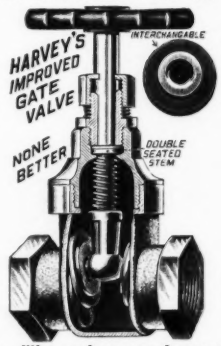
One special feature is the style of the waterway tubes, which are inclined upward toward the center of heaters, thus insuring perfect circulation and bringing the heated water to the center flow header from each side return header. The draft is drawn to the front through the lower flues and back through the upper flue, giving a maximum amount of heating surface. This arrangement makes one of the most effective and economical heaters on the market, as the many users in all parts of the country can testify. Upon application to the manufacturers, Reading Stove Works, Reading, Pa., or Dayton, O., a full description and book of recommendations will be sent.

W. H. Hobbs, Eau Claire, Wis., has some alteration work on hand in which he is using Cooper's Nautilus closet.—Adv.

Geo. W. Groves, Burlington, N. J., is plumbing a residence in that city, using Cooper's closets.—Adv.

An Improved Gate Valve.

The illustration we show herewith is an improved gate valve manufactured by A. Harvey's Sons Manufacturing Co., Ltd., dealers in steam, gas and plumbing goods, at Detroit, Mich. This valve has several unusual features. The discs are seated by a ball-bearing motion which takes the wear off the face

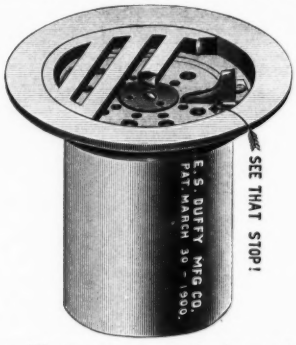


and seat. The valve can be repacked at the stuffing box without shutting off the steam, as the valve when fully opened seats the valve stem on the valve nipple. This valve has no special inlet side, but can be connected horizontally, vertically or otherwise, either side to the pressure. All parts are interchangeable, and can be supplied on short notice. It is made with screw ends from ¼ to 3 inches in size.

Snyvley Plumbing Co., Pittsburg, Pa., have some alteration work on hand in which they are using Cooper's Nautilus closets.—Adv.

"Non-Flud" Back Water Stop.

Chicago puts forth a good many good things in the plumbing supply line, and one of the latest of its good things is the "Non-Flud" back water stop, which is intended to prevent water backing up into the basement and to prevent foul gas and odors arising from the sewers. The action of this stop is positive under all condi-



tions. There are no swinging gates or rubber balls in it and nothing to permit it to get unseated by sediment or matches gathering in it. This is going to have a large sale in the plumbing trade, and if you want to be in on the ground floor you should write at once to the E. S. Duffy Mfg. Co., 6438 Wentworth avenue, Chicago, Ill., mentioning "Domestic Engineering."

Carthey & Dumbeck, Salt Lake City, have some nice work on hand in which they are using Cooper's goods.—Adv.

J. V. Reagan, Philadelphia, recently set Cooper's Nautilus and Reno closets in a residence in that city.—Adv.

City Delivery & Shipping Dept.
Telephone Call, 2302 Main

Main Office
Telephone call 190 Main

Thomas G. Knight

Plumbers' Steam and Gas Fitters' Supplies

WAREHOUSES:
351-353 & 364 Jay Street
50 & 52 Myrtle Avenue
359 Pearl Street

OFFICE: 359 PEARL ST.,
BROOKLYN, N. Y.

John Simmons Co.

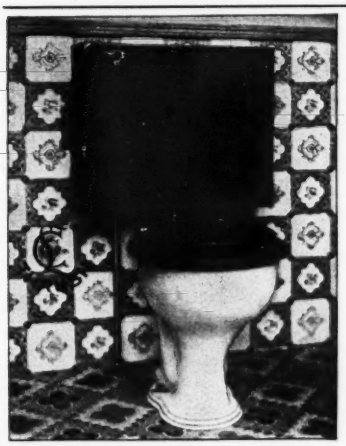
110 Centre Street
New York City

TRADE MARK

IRON PIPE, FITTINGS AND VALVES

FOR THE PLUMBER, STEAM- AND GAS-FITTER.

CAST-IRON SOIL PIPE
DRAINAGE FITTINGS
IMPROVED BATH-ROOM FIXTURES



"The Thrush, enrapturing heaven and earth."

THE

"Thrush"

LOW TANK
SYPHON
JET
CLOSET
COMBINATION

We have others.

COLWELL LEAD COMPANY
63 Centre St., New York

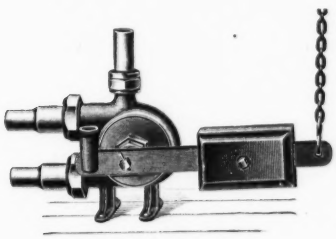
Telephone 640—38th Street
" 641 " "

John A. Murray

MANUFACTURER AND JOBBER OF

PLUMBERS', STEAM AND GAS FITTERS' SUPPLIES

625 AND 627 SIXTH AVENUE NEW YORK



Patented July 24, 1900.

Try It

and you will use no other.

ASBELL'S
FROST PROOF
HOPPER VALVE.

SEND FOR DESCRIPTIVE CIRCULAR AND PRICE.

THE S. J. ASBELL COMPANY
Van Houten St., near Cross St., PATERSON, N. J.

Mention Domestic Engineering.

Metropolitan Supply Company

Manufacturers and Dealers in

PLUMBERS' SPECIALTIES
PLUMBERS' and STEAM FITTERS' SUPPLIES.

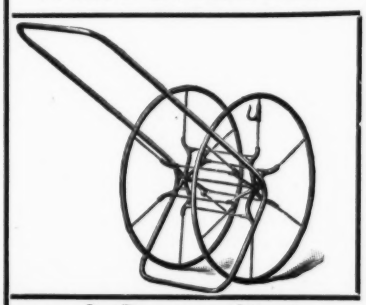
SLATE AND MARBLE WORK

FOR PLUMBERS AND BUILDERS & TILING OF ALL KINDS

2505 Third Ave., New York City
Bet. 136th and 137th Streets

Telephone 701 Melrose.

WIRT'S ALL IRON HOSE REELS



Are cheaper than Wooden Reels. They look better, last longer and give better satisfaction. They are the best for all purposes. Wirt's Wall Reels and Hump Racks for fire protection.

Wirt & Knox Mfg. Co.
219 N. Third St.
PHILADELPHIA, PA.

Our Discounts are Liberal

The best pump in the world cannot lift water from a dry well, but there is water down lower and a dry time is the best time to dig for it.

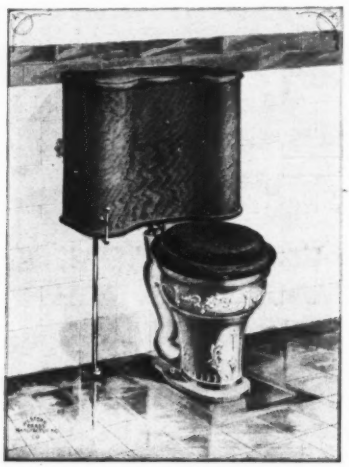
Heavy Iron Cocks.

The Western Tube Company, Kewanee, Ill., has placed upon the market a line of iron cocks of improved design combining increased strength, larger plug, with opening full area of pipe and a wide bearing to withstand heavy pres-

sures. We illustrate one of these cocks and the manufacturers will be glad to send you complete lines showing other manufactures, if you write them mentioning "Domestic Engineering."

The Adonis Closet.

This illustration is one of the numerous types of closets manufactured by the Western Brass Mfg. Co., 615-617 Walnut



street, St. Louis, Mo., which is shown in their advance sheets, which are now ready to be sent to the trade. It is a very modern low-down closet combination and avoids a long flush pipe from the tank to the closet bowl. Other styles of their closets will be quite as interesting as these. They will be described in the sheets referred to, which will be sent upon application, mentioning "Domestic Engineering."

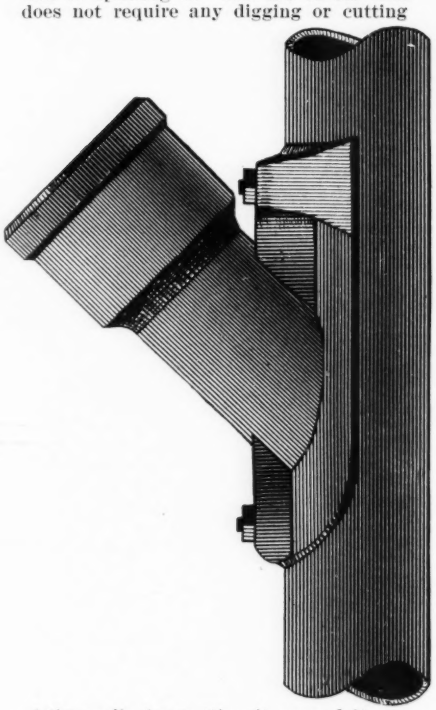
To Build an Addition.

The L. Wolff Manufacturing Company, of Chicago, are building a large addition to their Carrol avenue plant. The new building, which will front on Fulton street, will be three stories high and 125x 300 feet in ground measurement. It will be used for factory and warehouse purposes and will be equipped with electrical motive power, the company installing $25,000 worth of electrical apparatus for that purpose.

Sam'l Crowther, Philadelphia, has some work on hand in which he is using several of Cooper's closets.—Adv.

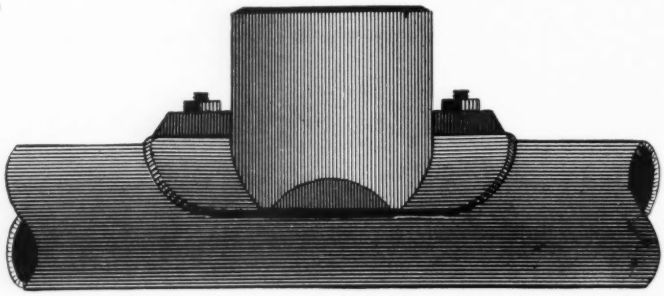
Some Useful Devices.

The first illustration we show in connection with this article is the saddle hub made in "Y" form for soil pipes. By using this saddle hub a thorough job of tapping a line of soil pipe can be done without drilling the pipe and having the risk of splitting it. The use of the hub does not require any digging or cutting



of the walls for putting it on and it can never slide down out of place. It is also made in "T" shape for right-angle connections.

The second illustration is of the N. R. pipe cover for closing openings in iron pipes after they have been opened for

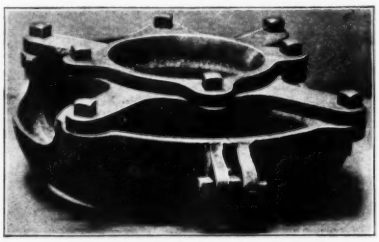


cleaning purposes. It makes a tight fitting joint and can be used on any pipe, light or heavy. This fitting requires no digging or cutting to put on the pipes, and is much handier than the band or entire covering. Upon application to Chas. Weissberg, dealer in plumbing and gas fitting supplies, 47 Sheriff street, New York City, prices of these excellent devices will be sent, together with sizes. Kindly mention "Domestic Enginering" in writing.

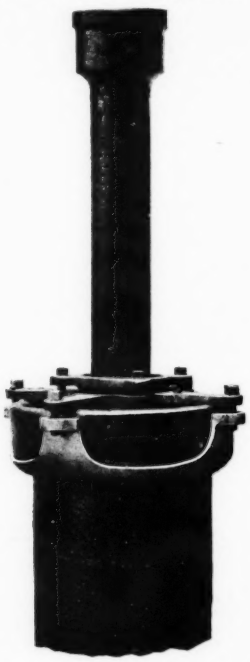
M. J. Gibbons, Dayton, Ohio, recently placed two Nautilus closets in a fine residence in that city.—Adv.

A Sewer Connection and Clean-Out.

Geo. F. Ryan, a prominent Chicago plumber has invented a hygienic sewer connection and clean-out which prevents the escape of sewer gas from broken sewer joints, and does away with the flooding of cellars from defective joints

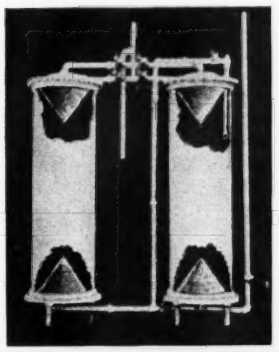


and the escape of sewage from broken sewers. Mr. Ryan claims that this is the only movable sewer connection ever invented. By examining the joint closely it will be seen that it is impossible for back water or sewer gas to pass through it. It is so arranged that the hub of the crock sewer pipe sets into an



iron collar which is on the outside of the sewer pipe hub; this in turn connects with an iron flange with lugs connected to the same in such a way that the bolting of the two pieces together, that is, the collar and the flange section, having between them a rubber gasket, makes a perfect sewer-gas, air, water or pressure tight joint. On the inner side of the flanged section there is placed a rubber gasket so that when the soil pipe is placed in the connection, there is an iron collar which fits around it and compresses it, making a positively air and water tight joint, yet one which is movable.

THE ECLIPSE DUPLEX FILTER



Easily and thoroughly cleaned with Filtered Water.

No Alum or Coagulent used for Clarifying

Send for catalogue and hundreds of references on the best filter made in the U. S.

ECLIPSE FILTER CO.
Philadelphia Bourse

WE CAN SAVE YOU MONEY

Cooper's Adjustable Drain Trap

Has a 4-inch Seal and is an absolute protection against Sewer Gas. $1.75 to $2.00 SAVED ON EACH TRAP. Write and we will show you how to make money.

Libbey, Parker & Co., = Boston

Sales Agents for Libbey Drip Valve, Victor Ball Cock and Victor Brass Pipe Hanger.

Send for Catalogue.

RELIABLE TINNERS' FURNACE

MADE BY

The SCHNEIDER-TRENKAMP Co., Cleveland, Ohio.

SOMETHING NEW

Vanderman's Adjustable Fitting for Connecting Soil Pipe

Send for Catalogue and Price List of Plumbing and Heating Specialties, or order through your Jobber.

Freight allowed on the Adjustable Fittings, East of the Mississippi river, on a dozen of one or assorted sizes.

MANUFACTURED AND FOR SALE BY

THE VANDERMAN PLUMBING AND HEATING COMPANY
Willimantic, Conn.

S. P. STAMBACH. ROBERT LOVE

Stambach & Love

Plumbing Supplies and Sanitary Specialties

50 AND 52 N. SEVENTH STREET
PHILADELPHIA

THE WILHELMI | THE MODERN

TWO BEST BOILERS

The "Wilhelmi" is a high-grade copper range boiler tested to 250 pounds and guaranteed to stand a working pressure of 150 pounds. There can be no better boiler made.

The "Modern" is for use where the pressure does not exceed 100 pounds, as that is the guaranteed working pressure. It is tested to 200 pounds.

BOTH BOILERS GUARANTEED NOT TO LEAK AND AGAINST COLLAPSE

Very attractive Discounts Furnished

For Sale only by Jobbers of Plumbers' Supplies

HAYES MFG. CO., Paterson, N. J.

The McGuire Adjustable

ROOF FLANGE

No. 1. will adjust from ¼ pitch to ½ pitch
No. 2. will adjust from flat to ½ pitch

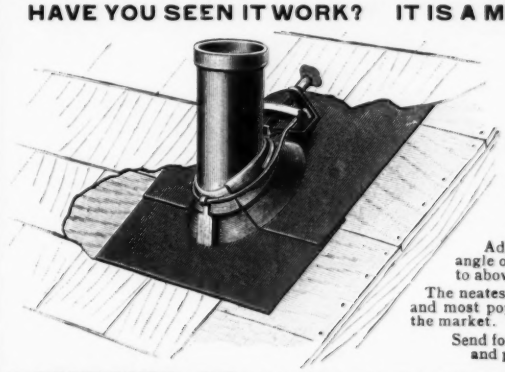
Made for Standard and Extra Heavy Pipe in copper and Galvanized Iron. Only two sizes to be carried in stock as the adjustments fit all angles.

For Prices, etc., apply to

KENDRICK VALVE AND WASHER COMPANY,
SYRACUSE, N. Y.

The above cut shows our No. 1, ¼ to ½ pitch

HAVE YOU SEEN IT WORK? IT IS A MARVEL.



Two-Part Acme Roof Flange

Adjustable to any angle of roof from flat to above 45 degrees.

The neatest, most unique and most popular flange on the market.

Send for catalog and prices.

ACME MFG. CO., WEST SOMERVILLE, MASS.

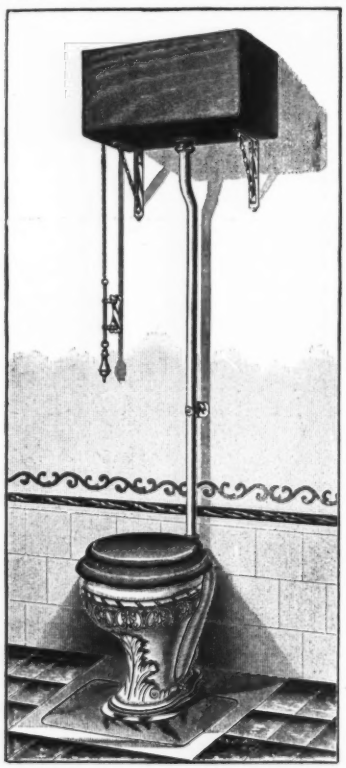
It will be noticed that the coupling is made in two pieces so that it can be used where it is impossible to take out a length of pipe without unnecessary work and damage to the sewer already in place. The collar section of the connection is made in two pieces, obviating the necessity of disturbing the old connection.

Another use of this connection is on down spouts, vent connections and fresh air inlets. The connection is also made for use on sewer pipes without a hub. Mr. Ryan has applied the same principle in making clean-out connections for earthenware pipe. We believe that this device is going to meet with very large sales and we trust that all of our enterprising readers who desire to protect their customers against noxious odors will write Geo. F. Ryan & Co., 3811 Cottage Grove Ave., Chicago, Ill., and secure their handsomely printed circular which illustrates the application of the connection.

Harry Cunningham, Norristown, Pa., has some work on hand in which he is using Cooper's goods.—Adv.

THE DIAMOND SYPHON JET.

This illustration is of a standard high-grade syphon jet closet manufactured by F. N. Dubois & Co., 243 Ninth avenue, New York City. It is a very excellently finished closet with rolled rim, and



makes as good a fixture as any one needs. The company also manufactures other types of closets, as well as the McClellan anti-syphon trap vent. They will be pleased to send circulars of their goods upon application if you mention "Domestic Engineering."

Allen C. Bates, Cohasset, Mass., is remodeling the plumbing in a house in that city using Cooper's Nautilus closet.—Adv.

JENKINS '96 SHEET PACKING.

No one can underestimate the value of an established reputation for character of one's product. In this respect Jenkins Bros., New York, Boston, Philadelphia and Chicago, have an enviable place, as their goods bear a very high reputation wherever they are used. Their '96 sheet packing is pronounced by steam users throughout the world to be the best joint packing manufactured and, if its weight is taken into consideration, it is not more expensive than others, as it weighs 30 per cent less than other packings. Upon application, mentioning "Domestic Engineering," they will be glad to quote prices.

Carey & Bro., Media, Pa., are plumbing a residence in that city, using Cooper's baths, lavatories, etc.—Adv.

PORCELAIN PLUMBING GOODS.

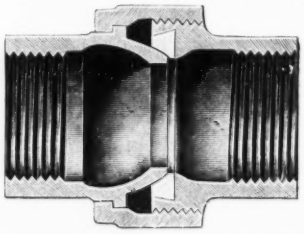
The plumbing goods of the Chas. Graham Chemical Pottery Works, 986-1018 Metropolitan avenue, Brooklyn, N. Y., have been favorably known to the trade

for many years. They are described in a catalogue which will be sent if you write, mentioning "Domestic Engineering." We illustrate one type of them and they are made in all the necessary styles to suit any purchaser.

Reeves, Cale & Howells, Canal Dover, Ohio, are remodeling the plumbing in a residence, using Cooper's Nautilus closets.—**Adv.**

THE KEYSTONE UNION.

This illustration shows a section of the Keystone malleable iron union with soft metal seat. It is always tight. It can be used where other unions are impracticable. It is manufactured by Stanley G. Flagg & Co., of Philadelphia, Pa., who would be glad to quote price upon application, mentioning "Domestic Engineering."



Bell Bros., Haddonfield, N. J., are plumbing the Gill residence, using Cooper's goods throughout.—Adv.

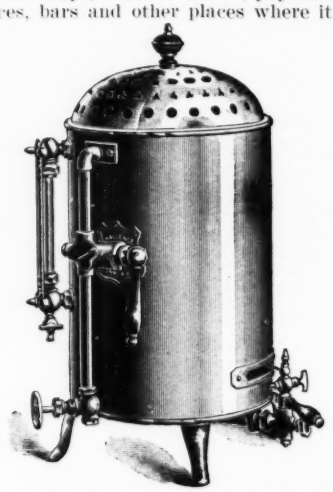
A STANDARD LINE OF HEATERS.

The H. B. Smith Co., of Westfield, Mass., are prepared to give perfect satisfaction with any order sent them for their line of steam and hot water heating boilers. Their line of heaters is very complete, including the Gold boiler, which supplies from 240 to 1,300 sq. ft. of steam radiation; the Mills, which in steam runs from 360 to 6,250 sq. ft. and in water from 600 to 10,400 sq. ft.; the Mercer boiler, which in steam supplies from 300 to 3,500 and in water from 500 to 5,800 sq. ft.; the Cottage boiler, which supplies with steam from 100 to 350 sq. ft. and with water from 150 to 1,000 sq. ft. of radiation; and the Menlo tank heater, which is made in sizes to heat from 100 to 180 gallons of water. The agent for European countries is Aug. Eggers, Bremen, and New York City. The Pacific agents are Dugan Bros., of San Francisco, and the western agents are the Western Brass Mfg. Co., of St. Louis. The H. B. Smith Co. maintains salesrooms at 133 Center street, New York City, and 510 Arch street, Philadelphia, Pa. Their handsome line of printed matter describing their heaters and radiators, all manufactured in their own plant, will be sent upon application if you mention "Domestic Engineering."

I. N. Tucker, Boston, Mass., is remodeling the plumbing in a residence, using Cooper's Nautilus closet.—Adv.

THE CHALLENGE HEATER.

This little heater is made by the Challenge Mfg. Co., of South Norwalk, Conn. It is adapted to bath rooms, lavatories, barber shops, dentists' offices, physicians' offices, bars and other places where it is

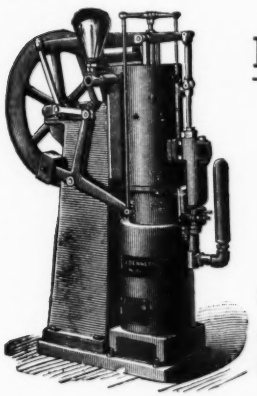


desired to heat water to a high temperature rapidly and cheaply. It will boil water in one and a half minutes after the gas is lit. Upon application, mentioning "Domestic Engineering," circulars and discounts will be sent.

John H. Moran, of Albany, N. Y., has an operation on hand in which he is using four of Cooper's closets.—Adv.

ELECTRIC WELD SEAMLESS RANGE BOILERS AND PRESSURE TANKS.

Electric welded range boilers and pressure tanks are becoming so well and favorably known by reason of their superiority that the John Wood Manufacturing Company, of Conshohocken, Pa., the sole manufacturers and owners of this process, have such a demand for their product that the business necessitates the doubling of their already extensive plant, and are now preparing plans for new buildings and machinery which, when completed, will be by far the largest plant in the world for this business. They are also contemplating building a new rolling mill in addition to those already on the ground to be used entirely for the manufacturing of range boiler plates of superior quality by a new and cheap process. Mr. Wood is a practical rolling mill man, having had experience from infancy up. He is also a distinguished mechanical engineer with many years' experience, and is the inventor of the celebrated Wood's water tube safety boiler which has a large share of the world's market, and now keeps seven large works engaged in their



Denney Improved

Rider and Ericsson

Hot Air Pumping Engines

Embody the very latest Improvements in Design and Construction.

The Most Reliable and Economical Engines for Pumping water.

Use any kind of fuel. Can be operated by anyone.

Perfectly Safe, Noiseless, Ever ready for Service

Built for years by

American Machine Co. WILMINGTON, DELAWARE

Agents Wanted in the West.

The Victor Supply Co.

Manufacturers and Jobbers of

Plumbers' Gas and Steam Fitters' Supplies

Write for Prices when in the Market.

Springfield, Ohio

PATENTED DEC. 4, 1894
PATENTED OCT. 15, 1895

Philadelphia Says It is the Best Beer Pump Made——

And our pamphlet tells why it is the only beer pump sold in town where it's made. We make attractive terms to our agents. Write us.

I.X.L. Pump Company

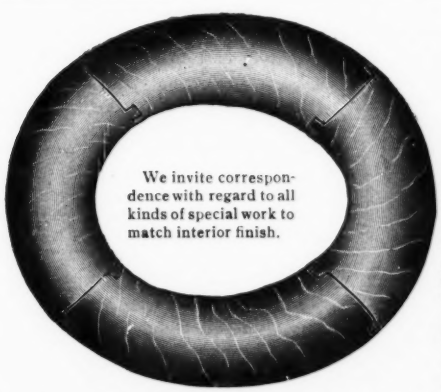
1015 Christian St., Philadelphia.

Self-Acting Hopper Valve

Very simply constructed. Has only one flat washer on inside. Repaired easily with pair of plyers. Does not hammer. Waste drains whole body of valve. Cannot waste when running. We give a very liberal discount to the trade and want agents.

The G. McG. Mfg. Co.

The G. McG. 1015 Christian St., Philadelphia, Penn.



We invite correspondence with regard to all kinds of special work to match interior finish.

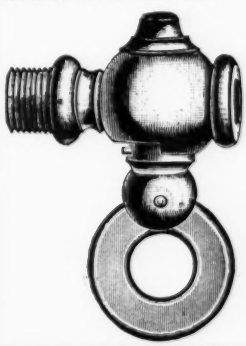
THE BEST PLUMBERS' WOODWORK MADE.

We make special orders in all fancy woods, such as Mahogany, Bird's Eye Maple, Sycamore, Black Walnut, etc.

We make drain boards in a superior manner, and invite sample orders.

H.B. Olmstead & Co.
87 Frankfort Street
NEW YORK CITY

Balls, Bodies, Binding Posts, Bushings, Caps, Cocks, Nozzles, Gas Stove Fittings, Nipples, Swings, Screws, Nuts, Wire Connectors Electrical Goods Etc., Etc. SPECIAL TURNING TO ORDER.



United Metal Mfg. Co.

525-527 Broome Street, New York

Manufacturers of

Gas, Electric and Combination Fittings

FROM BAR METAL

WATER SUPPLY WITHOUT WATER MAINS

The Kirtley Patent Domestic Water Service supplies country, village and suburban homes, business and public buildings with water supply where water mains are not accessible. Greatly increases a plumber's chance to do business. Write for descriptive circular.

GEO. P. KIRTLEY & CO., 1213 Walnut Street, Kansas City, Mo.

INTERNATIONAL SPRINKLER CO.

517 ARCH STREET, PHILADELPHIA, PA.

PRES., CLARKE MERCHANT
(Pres. of Merchant & Co., Inc.)

COMPLETE INSTALLATIONS MADE

"International" Head

THE BEST

The Company has a *complete equipment* for both the WET AND DRY SYSTEMS of Automatic Fire Extinguishers.

Its devices are fully protected by the U. S. Patent Office; and have the *full endorsement* of the *Insurance Companies*.

The "International" Head is in all respects the *best* on the market.

It is the *simplest, most reliable, most certain and most effective*. From *20 to 70 per cent. of cost of insurance saved* by putting "International" Sprinklers in your *foundry, factory or store*. Write for full particulars.

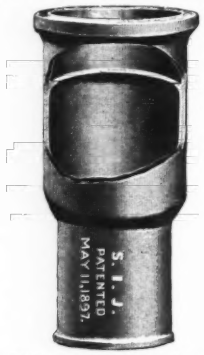
construction both in this country and Europe. He is also the inventor of sixteen other valuable mechanical patents all of which are in general use.

After many experiments he has perfected this new and wonderful process of electrically welding light cylinders, a process which bids fair for large volumes of business. It is claimed that the process is by far the cheapest known and superior to any now in practice. While some cylinders made for range boilers will scarcely stand a pressure of over 100 lbs. without leaking, the electric welded cylinders have been tested to as high as 1,200 lbs. to the square inch without developing a defect or leak, thus giving a large factor of safety for any purpose they are used for.

W. J. Robinson, Jr., Philadelphia, is plumbing a residence in which he is using Cooper's closets.—Adv.

THE "SISSON" INSERTIBLE JOINT.

R. Estabrook's Sons, South Boston, Mass., are manufacturers of the "Sisson" insertible joint for soil pipe. It is made in sizes from two to six inches, both light and heavy. This joint makes a very

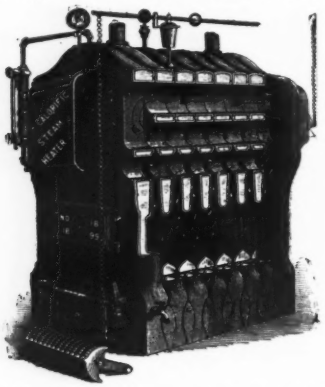


valuable fitting for the plumber, as it permits him to insert a length in a line of soil pipe without breaking the line down. Upon application to the company, prices will be sent, but the joint itself can be procured from jobbers.

Richard Ormrod, Philadelphia, has several fine operations on hand, in which he is using Cooper's goods.—Adv.

THE CALORIFIC HEATER.

This is a high-grade sectional heater for steam or hot water, manufactured to meet the requirements as to service and size, by the Calorific Heater Co., of



Easton, Pa. This company is in position to make unusual inducements to agents, and will welcome correspondence arising from the columns of "Domestic Engineering."

Sam'l J. Wilson, Philadelphia, recently set Cooper's Reno closet in a residence in that city.—Adv.

Jas. McCullagh & Co., New York, have some work on hand in which they are using Cooper's Clipper compression work.—Adv.

LEONARD CLOSET REPAIR COUPLING.

In this closet repair we have a device invented by a practical plumber who has endeavored to overcome the weaknesses he observed in other repairs on the market. Some of its advantages are that it has an open way; it is simple in construction; only a small amount of metal comes in contact with the earthenware, thus preventing the breaking of the bowl when the closet seat is dropped. It can be made to fit a round or oblong opening in the closet, the repair gasket conforming

to the opening. This is a very strong point in its favor. It is manufactured by Geo. B. Leonard, 216 E. 41st street, Chicago, Ill., and is approved by many of the leading plumbers of this city.

The Robert Patrick Plumbing Co. write that they consider this repair the only repair worth any consideration at the present time. They have used them for the last year and have never found a closet which they could not repair with it. Upon application to Mr. Leonard, mentioning "Domestic Engineering," prices will be sent.

Howard Neilson, Germantown, Philadelphia, is plumbing a residence, using Cooper's baths, lavatories and closets.—Adv.

ECONOMICAL HEATING.

On page X of this issue you may notice an advertisement of the Barnard boiler for steam and hot water heating. This boiler has so many good qualities and has given such excellent satisfaction wherever used that it will perhaps not be out of the way to call attention to one of its main points of superiority—the economical consumption of fuel. This point, together with its adaptability to different kinds of fuel, and its low price make it a very profitable boiler to handle and operate. We give below a few testimonials, which are most excellent:

Chicago, Ill.

We have used a good many of your sectional boilers, and in every case they have given perfect satisfaction, using a very small amount of coal, in proportion to the amount of heat furnished. They are very easily managed, and we must say, have been more satisfactory in every respect than any other boiler that we have put in. This we say after thirty years' experience in the heating business, and after having put in almost every make of boiler that is on the market.

W. H. CRAWFORD & CO.

Gilbert, Scott County, Iowa.

In the fall of '96 I purchased a six-section No. 3 Barnard boiler and placed it in my house, doing all the work myself without any previous knowledge of steam work. The results have been perfectly satisfactory, both in efficiency and economy of fuel. In the winter of '98-'99, I made a very careful and accurate estimate of the cost of heating my house. The winter you will remember was a very severe one, the mercury ranging from 0° to 20° below for twenty-one consecutive days. The fire was started October 21, and allowed to run for 166 days, supplying 180 feet of radiation and heating 7,964 cubic feet of space. The boiler is enclosed in a brick chamber and the heat from the boiler heats a hall through a register. The heater was run about twenty-three weeks at a cost for fuel of $31.50, or $1.40 per week, 20 cents per week a room, or less than 3 cents a day per room. Have I not reasons to be satisfied?

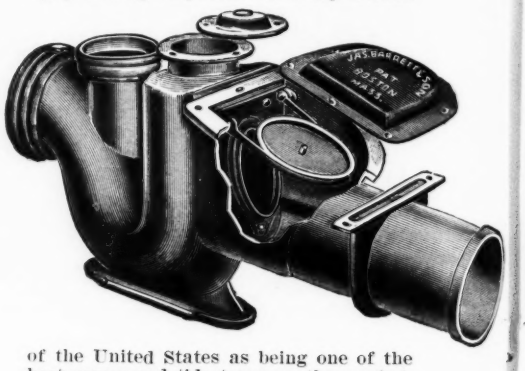
GEORGE ASHFORD.

In a number of instances slack has been used almost entirely with the best results. This boiler is made by the Barnard & Leas Mfg. Company, of Moline, Ill., who will be glad to send circulars or answer any inquiries, which mention Domestic Engineering.

John Getz's Sons, York, Pa., are plumbing a residence in that city, using Cooper's closets.—Adv.

THE BARRETT SEWER TRAP.

We illustrate herewith the "Barrett" sewer trap. It has been used by the United States government and other customers for fifteen years. It is endorsed by plumbing inspectors in every section

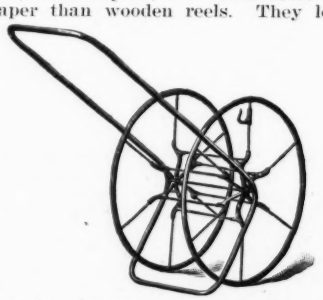


of the United States as being one of the best sewer and tide traps on the market. Upon application, mentioning "Domestic Engineering," catalogue will be sent which will show the good points of this trap.

Brison Plumbing & Heating Co., Wilmington, Del., are plumbing the residence of Dr. Flinn, using Cooper's closets, bath, lavatories, showers, etc.—Adv.

THE TIME FOR REELS.

The plumbing trade is just now ready to consider the purchase of hose reels. We illustrate an all-iron hose reel made by Wirt & Knox Mfg. Co., 219 N. 3d street, Philadelphia, Pa. Iron reels are cheaper than wooden reels. They look



better, last longer and give better satisfaction. This company also manufactures a large number of patterns of wall reels and hose racks for fire protection. They will be pleased to send to any one interested a catalogue describing their goods, which carry a very liberal discount. In writing, mention "Domestic Engineering."

W. R. Park & Son, of Taunton, Mass., have an operation on hand in which they are using Cooper's Nautilus closets.—Adv.

Eagle Stills Sell Well

They look well, work well, wear well—better than others that cost more and do less Sanitary. Self-purifying. Automatic. Simple. Three parts – retort, distillate reservoir and condensing dome. Skeleton pattern handles. Nickel-plated faucets. 9 inches high, 15 in. diameter.

TWO STYLES.

No. 9. Best Rolled Sheet Steel, heavily coated idside and outside with pure block tin, weight 3¼ pounds—$5 retail.

No. 11. Best Hard Rolled Solid Sheet Copper, pure block tin lining, weight 6 pounds—$8 retail.

Liberal Profit for Plumbers. Write

Health & Comfort Supply Mfg. Company
CINCINNATI, OHIO

SALOON WORK PAYS

Write for terms to agents. Territory free.

AND THIS

FOUNTAIN BEER COOLER

pays very good profit. It can always be sold to saloons newly installed and old tin coils, nasty and unhealthy, can be replaced by it. It is porcelain enameled inside and out, and is perfectly adapted to draw cool, clean and fresh beer.

THE SEITZ BEER COOLER MANUFACTURING CO.
PEORIA, ILLINOIS.

DIAMOND MANTLES

HAVE NO EQUAL

Investigate their merits and you will have an advantage over the dealer who uses any other make. Our chemist has had twenty-one years experience and in the "DIAMOND" has evolved the greatest efficiency possible in a mantle, a pure white incandescence of great candle power, equally good for gas or gasoline.

Diamond No. 1,	-	**$12.50 per hundred**
Diamond No. 2,	-	**10.00 "**
Diamond High Pressure No. 1,		**18.00 "**
Diamond High Pressure No. 2,		**16.00 "**

SPECIAL DISCOUNT TO JOBBERS

Small orders, cash with order. Money refunded if goods not perfectly satisfactory.

Omaha Mantle Mfg. Co., 1319 Douglas St., Omaha

THE ONLY SANITARY WASTE

THE PURITY BATH & BASIN WASTES

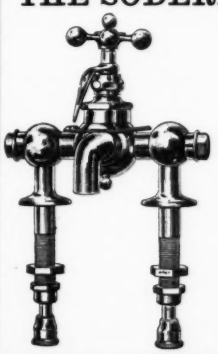
cut off the water in the Bowl or Bath from direct contact with the FILTH IN THE OUTLET PIPES.

Opens or closes with a touch,
Simple in construction,
No parts to get out of order.

FOR FULL PARTICULARS ADDRESS

THE H. M. WEAVER CO.
MANSFIELD, OHIO
New York Office: No. 81 Fulton St.

THE SODERLUND TWIN FAUCET



A COMBINATION HOT AND COLD WATER FAUCET WITH BUT ONE HANDLE. FOR BATHS, LAVATORIES AND SHOWERS.

Its features Cannot leak; practically self closing; always operates; simple; indicator shows temperature of water being drawn; gives full force of pressure; serviceable; sells on sight.

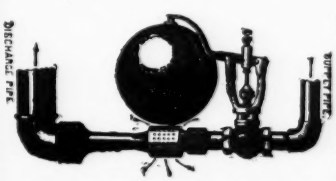
For prices write

UNION BRASS WORKS
11 Hawkins Street
BOSTON MASS.

BRAENDER'S CELLAR DRAINERS

Automatic

Operated by Water or Steam Pressure.



It is the Best, therefore the Cheapest

It is used in Municipal and U. S. Government Departments, endorsed by leading sanitary experts, and is guaranteed to do all that is claimed for it. Write for circulars and testimonials.

Sales Agents: W. N. McKenna, 73 Chestnut St., Boston, Mass.
J. E. Douglass, 40 Dearborn St., Chicago.

Sold to the Trade Only

PHILIP BRAENDER 47 W. 125TH ST. NEW YORK.

Billings Pipe Bender

Patented September 24, 1889
Invaluable to Plumbers—Saves Ten Times Its Cost Every Month. Send for Prices.

This device is a **Specially Shaped Spiral Spring** made from **Crucible Steel** wound tapering to one end so as to be easily withdrawn, and having a loop at the other to hook into when the bend is to be made in a long piece of pipe. The Bender placed inside of the pipe, supports and prevents the pipe from flattening or collapsing while being bent. By the use of it lead pipe, and copper, brass or steel seamless tubing may be quickly and easily bent. It is as easy to form opposite or double curves, such as goose necks, as a single bend.

We carry in stock ¾, 1, 1¼, 1½, 2, 2½ and 3 inch Benders.
Special sizes on demand.

The Billings Pipe Bender Mfg. Co.
38 Park Place and 33 Barclay Street NEW YORK CITY

CHAS. THACKARA, Pres. W. F. DUFFIELD, Treas. ELIAS HOGELAND, Secy.

ESTABLISHED 1842.

THACKARA M'F'G. COMPANY,

ELECTROLIERS,

GAS AND COMBINATION

FIXTURES,

1606 Chestnut Street, Philadelphia.

John C. Gunzer, Chestnut Hill, Philadelphia, recently placed several of Cooper's closets in some work he has on hand. —Adv.

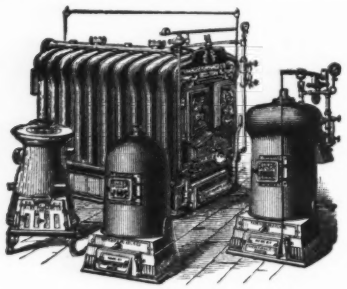
FLOATS.

If you are in the market for floats of any kind for any purpose you should communicate with the Naugatuck Mfg. Co., Naugatuck, Conn. They manufacture seamless copper ball floats tested to 300 pounds for steam traps, regulators, etc., and guarantee them for one year. Upon application, mentioning "Domestic Engineering," they will be glad to send circulars with prices and discounts.

McMullen Bros., of Bristol, Pa., have a fine operation on hand in which they are using Cooper's baths, lavatories, etc.—Adv.

THE MAGEE HEATERS.

We illustrate several types of the Magee steam and hot water heaters made by the Magee Furnace Co., Boston, Mass. They make several claims for their heaters, one of which is that they manufacture the most complete line under one name in the United States. Their heat-



ers run in water from 100 to 6,000 sq. ft. of radiation, and in steam from 200 to 3,600 sq. ft. of radiation. They are anxious to correspond with firms who are so circumstanced that they can act as agents for the Magee line, and any correspondence mentioning "Domestic Engineering" will receive prompt attention.

F. T. Burgess, of West Newton, Mass., is plumbing a fine residence in that city, using Cooper's closets, lavatories, etc.—Adv.

AN ACCESSIBLE CLEAN-OUT.

We illustrate herewith the four-way clean-out and branch back water gate manufactured by the Iron Sanitary Mfg. Co. 52-54 Dearborn street, Chicago, Ill. These gates resist sewer or back water pressure and permit the location of the sewer to be always known and accessible

without disturbing floors or concrete. Each fitting has iron inspection man-hole running to the surface with a tight but removable cover. Arrangements can be made by which these fittings can be flushed by hose or connected with the main water supply for flushing. They are made to fit either iron or clay drainage pipes. There are certainly no better sanitary fittings on the market than these. Catalogue describing and illustrating these and other types of fittings will be sent upon application if you mention "Domestic Engineering."

Godfrey, Krouse & Co., Philadelphia, are remodeling the plumbing in a residence, using Cooper's Nautilus closets.—Adv.

OAKUM.

When in the market for oakum in any quantity you should address the Planet Mills Mfg. Co., 335 Carroll street, Brooklyn, N. Y., who are in position to supply oakum at a very low market price.

THE BROUGHTON SELF-CLOSING BASIN COCK.

This is an old and familiar friend to the plumbing trade. Sometimes old familiar friends are forgotten unless we see them occasionally. Acting on this principle the E. Stebbins Mfg. Co., of Springfield, Mass., manufacturers of this basin cock, are very enterprising in keep-

ing it before the trade. There are no exposed surfaces in this basin cock. It is easily kept clean and is very superior in point of simplicity and strength. Every one is warranted and the company stands behind this product to the fullest extent. Circulars and prices will be sent upon application, mentioning "Domestic Engineering."

HANDSOME DISPLAY IN PITTSBURG.

The Standard Heater Company, manufacturers of the Standard instantaneous automatic water heaters, have opened at the corner of Wood street and Third avenue, Pittsburg, Pa., handsome salesrooms and offices for the sale and display of their heaters.

Harry C. Mellon is placing two of Cooper's needle baths in St. Gabel's Rectory, Philadelphia.—Adv.

WEST VIRGINIA COMPANY INCORPORATED.

At Charleston, West Virginia, Clark Howell, J. R. Shanklin, Earnest Howell, J. H. Dowman, Andrew Coffey, W. G. Barrer and W. A. Bodill have incorporated the West Virginia Heating & Plumbing Company, with a capital of $50,000, of which $5,000 is paid in.

A GROWING BUSINESS.

The American Distributing Company of Syracuse, N. Y., whose office and warehouse are at 105 West Kennedy street, nera South Salina, with factory at 307 North Geddes street, are doing a steadily increasing jobbing business in plumbers' and steam-fitters' supplies and specialties. Their extensive line embraces low down and high tank closets, plumbers' earthenware, hot water range boilers, enameled and copper lined bath tubs, closet seats and flush pipes, sinks of every description, high and low pressure ball cocks, brass ferrules, compression bath cocks, hot and cold water packings, gasoline torches, plumbers' furnaces and all parts and fittings. They will be pleased to send upon application their most recent catalogue, No. 26, and also their latest discount sheet.

The American Distributing Company is manufacturing and handling a bib seat dresser, bearing the appropriate name "Faultless," which is winning its way wherever it goes. This tool, which should be in the hands of every plumber in the country, is practical and effective in every sense, and can always be depended on to "do the work" and do it accurately. It is made of heavy brass, nickl plated, with removable cutters in four sizes. The revolving shank is encased in a long sleeve, holding the cutter rigid when the funnel is screwed down on top of valve, thereby cutting a true, perfect seat in all sizes of bibs. The "Faultless" bib seat dresser is 4¼ inches high, and can be sent by mail, the postage being only twelve cents. A postal card addressed to the company will procure an illustrated circular with price to the trade. The president of this company is H. Romeyn Smith who is well known throughout New York and adjoining states for his business capabilities and fair dealing. H. P. Thompson is representative.

Hebert & McNine, North Adams, Mass., have a nice residence on hand in which they are using Cooper's baths, lavatories, closets, etc.—Adv.

THE OSTER DIE STOCKS.

Modern tools are necessary for modern work. No plumber or steam fitter can make his way nowadays without having a modern equipment of tools, and no equipment is modern unless it contains some of the tools made by the Oster Mfg. Co., of 8 Prospect street, Cleveland, O., whose die stock we illustrate herewith. Their entire line is shown in a catalogue which will be sent upon application if you mention "Domestic Engineering."

Byron Parker, of Hudson, N. Y., is overhauling the plumbing in a residence in that city, using Cooper's Nautilus closet.—Adv.

A NEW PENNSYLVANIA SUPPLY FACTORY.

The New Castle Sanitary Plumbing Supply Company, New Castle, Pa., are to erect a plant, which will be a manufactory along the line of diversified industries. The men back of the enterprise are James Simpson, Matthew Platts, H. F. Weaver, C. P. Taggart, John Reis, Edward King, John M. Butz, Rufus Patterson, C. J. Kirk, John W. Knox, William M. Brown, Geo. G. Pryor and George Greer. Architect W. G. Eckles, of New Castle, is now engaged in drawing the plans for the eight buildings to be erected.

Henry Jackel, Philadelphia, is plumbing a fine residence in Philadelphia, using Cooper's baths, shower, filters, etc.—Adv.

THE LEONARD CLOSET REPAIR

Read what the Trade say;

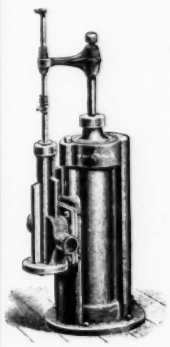
"I am pleased to be able to highly recommend it after giving it a thorough trial. It certainly fills a long felt want, because it will fit any closet. It is simple, strong and durable and I have failed to find one leak after first putting it in place."

F L. PORTER, CHICAGO

Sold by Plumbing Supply Houses. Send Sixty Cents for Sample.

GEO. B. LEONARD

216 East Forty-first Street, Chicago.



WATER ENGINE FOR BLOWING PIPE ORGANS

Water Motors

for all kinds of power.

Also Gas Engines

Chicago Water Motor & Fan Co.

216 Lake Street CHICAGO, ILL.

High Grade Thorium

WRITE FOR QUOTATIONS

J. MARSCHING & CO.

27 Park Place **New York**

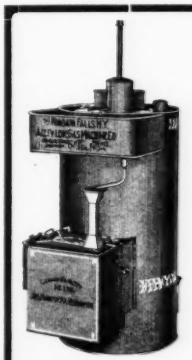
Extra Brilliant **Bronze Powders**

IN GOLD, ALUMINUM AND ALL COLORS.

Send for samples and prices to

J. MARSCHING & CO.

27 Park Place **New York**



Write for Terms

The Niagara Falls Acetylene Generator

Like its patronym, **Powerful and Never Failing.** Costs less than any; attached to any house-piping; automatic in production. Really the best for agents.

Niagara Falls Acetylene Gas Machine Company.

NIAGARA FALLS, N. Y.

FAULTLESS Bib Seat Dresser

Heavy Brass, Nickel Plated, Removable Cutters in four sizes, ⅜, ½, ⅝, ¾ in. Height 4½ in. Revolving shank encased in long sleeve, thereby holding cutter rigid where bell shaped funnel is screwed down on top of valve, hence cutting a true, perfect seat in all sizes of Bibs.

This is the only practical tool of its kind on the market. Send for prices

American Distributing Co.

SYRACUSE, N. Y.

C. A. MILLER

C. N. MARCELLUS

Master Plumbers

we have got you between us.

The Sanitary Supply Co.

Grand Rapids, Mich.

H. S. HUBBARD

BELL PHONE MAIN 336 - CITIZENS 2262

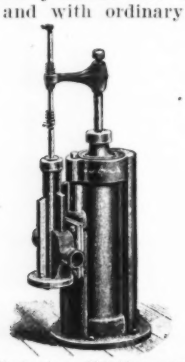
The Policy of this Journal

WE believe success—long continued, permanent success—can only be achieved in the newspaper business by conducting it in the same way a man builds a good reputation—it must have character back of it, and character, a strong character, must be based on honest intention. We all slip up in fulfillments, but good intent is necessary if good fulfillment ever comes. Our intent is to print the best trade journal in the world, in the best way, seeking for the best result. If you think we are falling short of the mark, in the interest of good results, please let us know.

DOMESTIC ENGINEERING,
Jno. K. Allen, President.

THE CHICAGO WATER MOTOR.

We illustrate the Chicago water motor, a device for operating organs, ventilating fans, sewing machines, elevators, small lathes and dairy machines. The motor is adapted for all the purposes above mentioned. They are made from the best material, the case being of heavy cast iron and the interior parts which come in contact with the water being made of the best composition metal, which avoids erosion. The journals are lined with phosphor, and with ordinary use these



motors will last a lifetime without any repair being required. The power developed with these motors is very great in proportion to the water used. A very excellent feature is the system of graded nozzles by which the amount of water consumed is adapted to the amount of work done. Upon application to the Chicago Water Motor and Fan Co., 216 Lake street, Chicago, Ill., a catalogue giving the complete application of these machines will be sent, if you mention "Domestic Engineering."

HALF THE HANGER HANGS THE PIPE.

The John Simmons Co. have taken up the manufacture of an improved pipe hanger, the patent for which they have acquired lately. The "American" hanger is well known to the trade as a practical, as well as theoretical saver of time and trouble. It is an open secret that hundreds of fitters, even in these days, will spend innumerable hours in roping or wiring up temporarily a long line of pipe before they will put on the proper hangers, which are to hold it in place, eventually, and then necessarily spend more hours of labor to remove the ropes or wires.

The "American" pipe hanger disposes of this trouble, which accompanies many other makes of these misnomers, by doing the temporary, as well as the eventual hanging, as soon as put up. The run of the line of pipe determined, the "American" hanger is put in place, and the two-third part, which is shaped into a large hook, will temporarily hang the pipe, until the line is ready to have the hangers locked up and bolted, which has proved to be the operation of a few minutes only. The "American" hangers are made of malleable iron, and have been thoroughly tested as to their stretching and supporting qualities, and they are warranted in every respect.

A unique accessory to this hanger, which is of particular service in modern buildings where pipe is usually hung from iron beams, is the "Acme" beam clamp, also made by the John Simmons Co., being a simple, inexpensive and thoroughly reliable clamp, the use of which will save a great deal of money over the old style hand-forged, bolted clamps still used on a great many jobs.

Upon application to the John Simmons Co., No. 110 Centre street, New York, they will gladly mail a pamphlet descriptive of these two, as well as other specialties, which might prove interesting and economically advantageous to you.

AN INVENTION FOR SALE.

L. F. Altpeter, 758 S. Halsted street, Chicago, Ill., is the inventor of a method of soldering aluminum, brass, iron or other metals. He has on exhibition at his place samples of the work done and desires to dispose of the invention. He has no solder for sale, it not being his purpose to manufacture solder, but rather to dispose of the patent to people who are in a position to manufacture it.

TRADE CONSTANTLY INCREASING.

We are advised by the Herendeen Mfg. Co., Geneva, N. Y., that their business this year has increased decidedly in comparison with other years, and their new boiler, the Furman sectional new model, is meeting with pronounced success. The orders for it are really giving them a little more than they can do to fill them.

Walter & Fairer, Easton, Pa., are plumbing the Maxwell residence, using Cooper's baths, lavatories, closets, etc.—Adv.

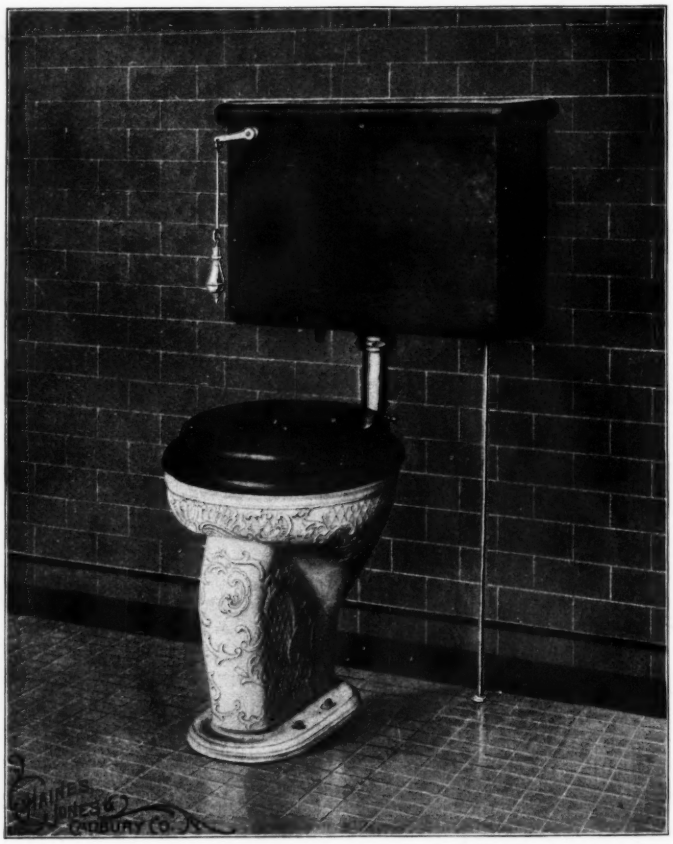
RUBBER THAT SPEAKS.

We do not mean by the above heading that this rubber actually talks but quote from the uniquely gotten up, effectively displayed and hit-the-nail-on-the-head letter sent out to the jobbing trade by the Mechanical Rubber Co., of Cleveland, in which they say that their rubber goods prides itself on the fact that quality and the right price have built them a business that wears. That is exactly what every good manufacturing concern wants—business that will stand by them. If the goods are of the best, and the price right a firm should have a healthy patronage. The Mechanical Rubber Company talks square from the shoulder and stands ready to back up the assertions they make in the letter recently sent out to the trade.

Wm. Smith's Son, Philadelphia, is plumbing the new Malta Boat Club house using Cooper's closets, lavatories, showers, etc.—Adv.

THE "SEDATE" CLOSET.

The illustration shown herewith is the "Sedate" siphon hopper closet which is recommended by the manufacturers, Haines, Jones & Cadbury Co., of Philadelphia, as being a high-grade, perfect,



low-down closet combination. They are in position to quote prices on any goods desired in the plumbing line. In writing them, please mention "Domestic Engineering."

John C. Gunzer, Chestnut Hill, Philadelphia, is plumbing a house at Mt. Airy, using Cooper's closets, lavatories, etc.—Adv.

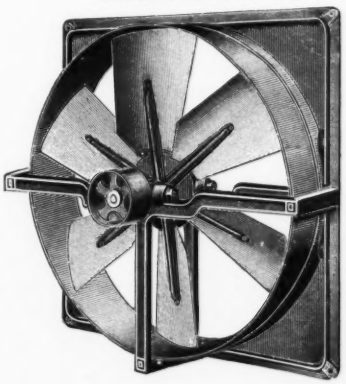
THE ONLY Metal Outlet Wash Down on the market with a Siphon Action...

The Dececo Colonial

Has large area of standing water, deep seal, strong siphonic action, no jets, full 3 inch waterway, noiseless action, self-testing submerged outlet joint. Uses only one half the amount of water required for jet closets. Furnished with N. P. Brass Outlet through floor or wall, high or low down tanks, or Dececo Flush Valve as shown . . . . . .

The Dececo Company
Boston, Mass.

TRIUMPH EXHAUST FAN



Specialty Mfg. Co.

INDIANAPOLIS, IND.

MANUFACTURERS OF

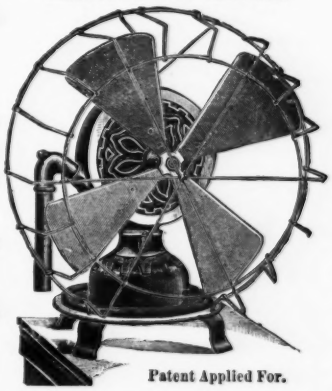
TRIUMPH EXHAUST FANS, Belted in sizes of 14 inches to 96 inches; direct connected for all standard voltages of direct current, in sizes of 30 inches to 48 inches.

CEILING, COUNTER AND FLOOR COLUMN FANS for belt power.

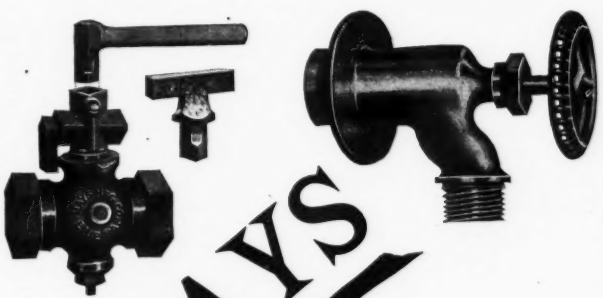
WATER DESK FANS, COUNTER AND FLOOR COLUMN FANS, for water power and water motors.

Write for Catalogue and Discounts.

TRIUMPH WATER DESK FAN



Patent Applied For.



HAYS

Brass and Iron Goods

Original McNamara Hydrants and Street Washers.

HAYS MANUFACTURING CO.
ERIE, PA.

The Champion

Water Filters

ARE

Germ Proof and Give Perfect Satisfaction

MADE IN

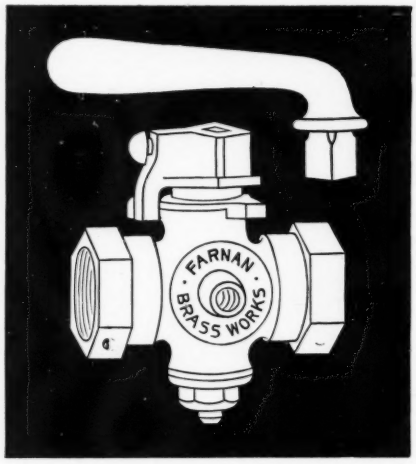
FIVE STYLES AND FOURTEEN SIZES.

Secure a profitable Agency.

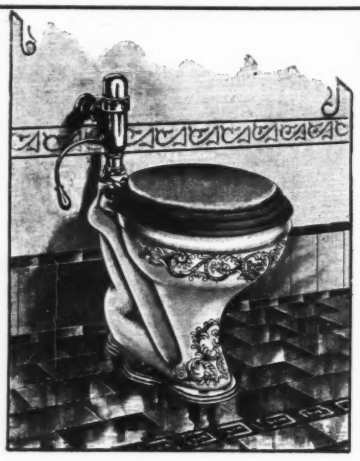
Catalogue and Prices upon application.

THE
Champion Safety Lock Co.
95 Woodland Ave., Cleveland, Ohio, U.S.A.

HARMONY OF HIGH QUALITY
AND REASONABLE PRICE.
SUCH IS OUR POLICY. TRY US.



FARNAN BRASS WORKS, CLEVELAND, OHIO



PATENT APPLIED FOR

Fig. E. 99. ANGLO. Lever action.

IT WILL PAY YOU TO DROP US A LINE FOR OUR CIRCULARS AND PRICES OF

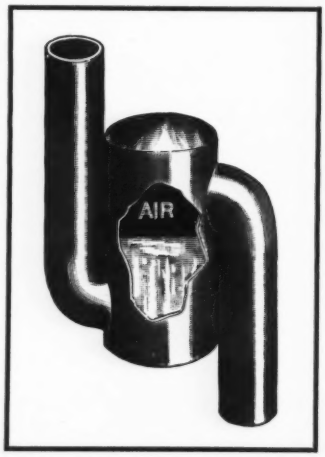
The Watrous

"AQUAMETER"

It is a self-measuring flush valve for water closets and urinals, automatically measuring the water for each flush. No more ball cocks, individual tanks or flush pipes needed, as it may be attached direct to pipe from city main or storage tank. Made in two styles, **lever action and seat action.** The WATROUS "AQUAMETER" is in use in many of the best buildings throughout the country, giving perfect satisfaction in all cases. We would be pleased to refer you to same on application. We use no cup washers in the construction of this valve. Manufactured and for sale by

Peck Brothers Company

231-237 Washington Street CHICAGO, ILL.



OUR HEARTY THANKS

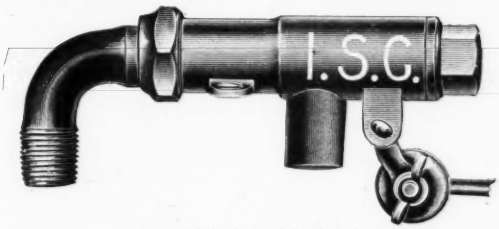
We extend to the trade and our plumber friends in general for their very liberal patronage of the **Clean Sweep Trap** the past year. We hope a continuance of your good will and if possible shall give you a better article in the Trap line than ever. The **Clean Sweep Trap** has no mechanical features whatever. Clean, wholesome, sanitary, under all conditions. **Please have** an eye on the **Clean Sweep Fuller work,** fine appearance, excellent workmanship, hammerless. That's all. Traps are sold by all jobbers in the United States, England, Canada, Germany, Norway.

Detroit Sanitary Supply Company

27-29 Jefferson Avenue DETROIT, MICH.

THE I. S. C. BALL-COCK

SEND FOR CATALOGUE OF CURTIS' ENGINEERING SPECIALTIES.....



Sizes ½ inch to 4 inches in stock.

OVER A MILLION IN USE.

Valve is balanced.
Will not hammer even under pulsations of a pump.
Has renewable seat of best steam metal.
Is perfectly noiseless.
Full sized area.
Good in any place for high or low pressure.

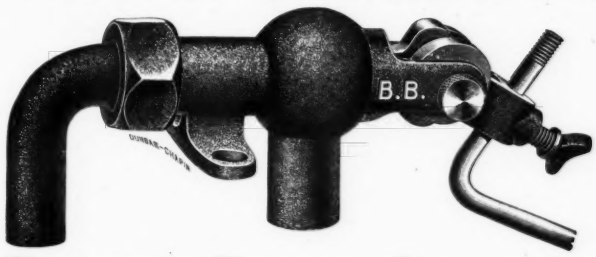
GUARANTEED

SEND SAMPLE ORDER

JULIAN D'ESTE COMPANY

24 CANAL STREET, BOSTON, MASS.

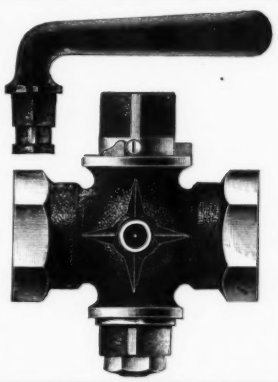
THE B. B. HIGH-PRESSURE BALL COCK



THE SIMPLEST AND BEST COCK EVER MADE.

No special packing required. Ground joint coupling which is always tight. Roller bearing lever on cam, reducing friction to lowest amount. No hammering, no singing or whistling. Has only one packing which is easily removed. Removable seat of best steam metal. We are making Floats stamped with our B. B. which are thoroughly guaranteed. Ask your jobbers for them.

Boston Brass Co., 36 & 40 Oliver St., Boston, Mass.



PATENT INVERTABLE

STOP AND WASTE COCK

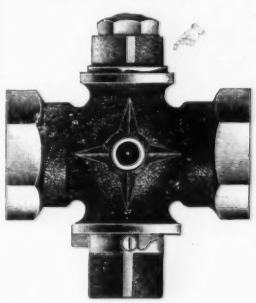
WATER AND GAS GOODS
PLUMBERS' SUPPLIES

J. B. CAMPBELL BRASS WORKS.

OFFICE and WORKS: 16th and CAMERON STREETS

ERIE, PA.

See that Square?



"PAWNEE"

LOW DOWN SYPHON HOPPER

WITH JET

ROUGHS IN AT 12 INCHES

QUIET AND EFFECTIVE IN OPERATION. WRITE FOR PRICES.

WE CARRY A COMPLETE STOCK OF **LOW DOWNS.**

FLECK BROS., PHILADELPHIA, PA.

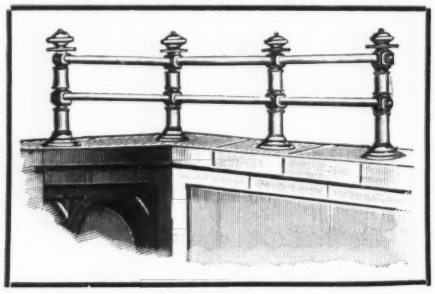
E. C. BELL MFG. CO.

MANUFACTURERS OF
STEEL CLAD AND GALVANIZED
STEEL ENAMELED

BATH TUBS

281 WATER ST., NEW YORK

PLUMBERS' FINE WOOD WORK, LOW DOWN TANK COMBINATIONS, FLUSH AND SUPPLY PIPES

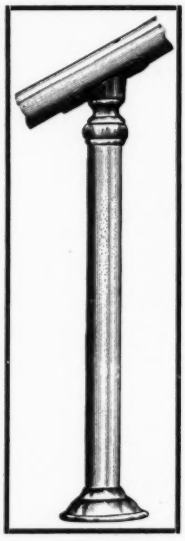


BRASS RAILING

HAND RAILS FOOT RAILS BANK RAILS
BAR RAILS STAIR RAILS STORE RAILS

ALL KIND OF RAILS

RAILS IN ANY FINISH
BRASS, BRONZE, OXIDIZED COPPER.
NICKEL, SILVER AND GOLD PLATED.



The Best Work and the Right Price.

The Columbus Brass Co., Long and Sixth Streets Columbus, Ohio.

ESTIMATES CHEERFULLY FURNISHED.

Lausten Lead Works

PRATT AND MORGAN STREETS
CHICAGO

Bi-metallic specialties
Lead traps and bends

Write for prices

Lead pipe, sheet lead
Ebony gloss plumbers' soil

Only Mechanical Grease Trap

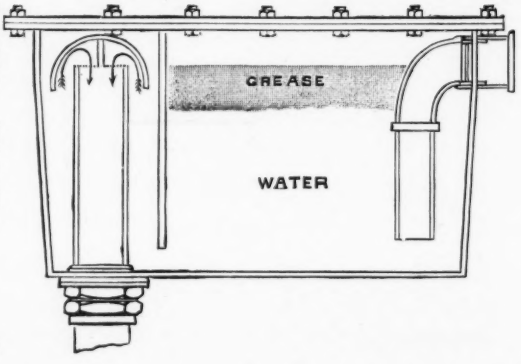
on the Market that will catch every ounce of grease

Only Grease Trap that can be easily taken apart and thoroughly cleaned.

Only Grease Trap containing an inside trap for quick action and removing of contents when desired. Connecting pipes may be increased or reduced from 1½ to 4 inches. Many other superior points will be advanced upon request.

Write or particulars

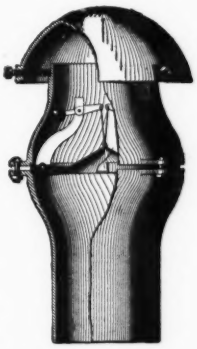
JAMES BARRETT & SON
48-50 Pearl Street and
209-211 Franklin Street
BOSTON, MASS.



The Ayres..... Fresh Air Inlet

PATENTED

Adopted by the Department of Buildings of Greater New York



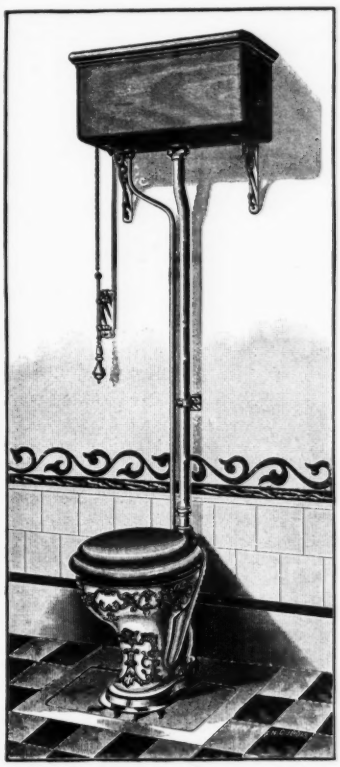
For Sale by Dealers in Plumbing Supplies only

MANUFACTURED BY

The Hart=Ayres Plumbing Co.

MANUFACTURERS OF PLUMBING SPECIALTIES

Fourth Avenue and Degraw Street,
BROOKLYN, N. Y.



"Defender"

Siphon Jet Water Closet

EQUAL TO ANY SIPHON JET CLOSET IN THE MARKET.

Complete line of tanks, seats and earthenware, also McClellan Anti-Siphon Trap Vent.

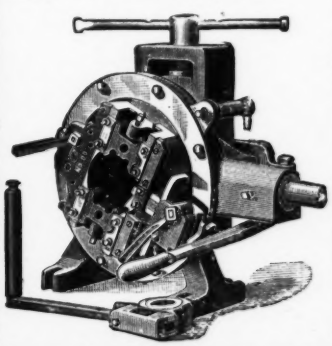
F. N. DuBois & Company, 243-247 Ninth Ave.
NEW YORK CITY

MINUTES COUNT

When you have a "Rush" Job on hand 'tis then the virtues of

ARMSTRONG'S
WATER, STEAM AND GAS FITTERS
TOOLS

make themselves apparent.



They are made especially for Time and Labor—Saving and for Extensive Wear.

PIPE THREADING and CUTTING OFF MACHINES
HAND or POWER
capacity from 1-4 in. to 6 in.

PIPE WRENCHES
VISES
ADJUSTABLE STOCKS and DIES

Send for Catalogue

THE ARMSTRONG MFG CO
BRIDGEPORT, CONN., U.S.A.
NEW YORK 139 CENTRE ST.

The NO-LEAK REGULATOR

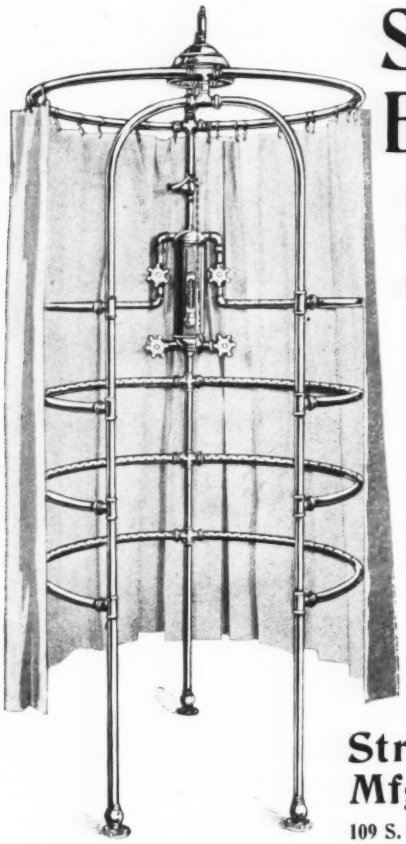
GUARANTEED NOT TO STICK OR LEAK

MOST PERFECT VALVE MECHANISM FOR CONTROLLING FLUID PRESSURE.

Patent Pending.

HughMerrie

225 East Ninth St.,
Cincinnati, Ohio



Shower Baths

Do we make them?

Well, we guess yes.

and any kind you may want, at prices that will interest you.

Catalogue for the asking.

Estimates cheerfully furnished on any special designs wanted.

Street & Kent Mfg. Co.

109 S. Jefferson St., CHICAGO

Accessible Sewer Flushing Fittings.

Flushing Clean-out Trap.

Four Way Cleanout and Branch.

Straightway Backwater Gate.

Resist sewer or back-water pressure; location of sewers always known and accessible without disturbing floors or concrete; each fitting has iron inspection manhole to surface, with tight but removable cover; flushed by hose or may be connected to main water supply.

Made for either iron or clay pipes. Back-water gates may be attached preventing flooding of cellars. Can you imagine anything better?

CATALOGUE FREE

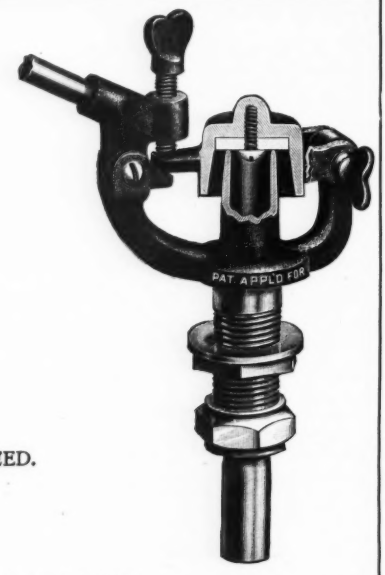
Iron Sanitary Mfg. Co.,

52-54 Dearborn Street
CHICAGO, ILL.

DALE

High Pressure Ball Cock

CANNOT POUND.
ALWAYS CLOSES.
ACCESSIBLE.
DURABLE.



PERFECT AND GUARANTEED.

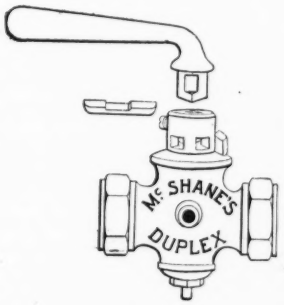
MADE ONLY BY

WOLVERINE BRASS WORKS

GRAND RAPIDS, MICH.

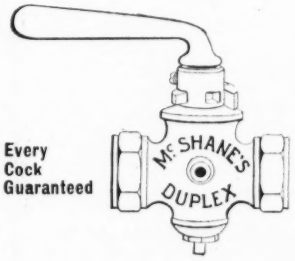
THE

"Duplex" Stop Cock



One of Simplest Cocks on the Market To-day

The above shows how easily the Cock can be taken apart and made either Right or Left hand as desired.



Every Cock Guaranteed

They are made of best metal and thoroughly ground

Each Cock is tested before leaving the factory

Manufactured only by

Henry McShane Mfg. Co.

BALTIMORE, MD.

You May Need Your Money!!!

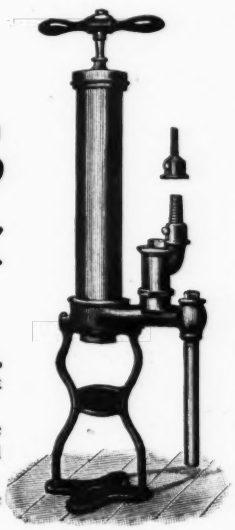
Don't buy 3 Pumps when one will do the work.

THE

PERKES

Patent Combination Air, Force and Test Pump.

Patented March 15, 1898.



Will test soil pipe, prove gas pipe, and there is no force pump made that is its equal.

No stuffing boxes; all valves are on the outside and work equally well with air or water.

Our circular will tell you of the other good points.

CHARLES PERKES

MANUFACTURER

Established 1856 627-629 Arch St., PHILADELPHIA

Plumbers Profit

We want every plumber to send for a free sample of

Wisconsin Graphite Pipe Joint Paste.

We want you to know by practical use, of the superior qualities of our

Pipe Joint Paste.

All joints whether steam, gas or water piping readily opened at any time.

Wisconsin Granular Graphite

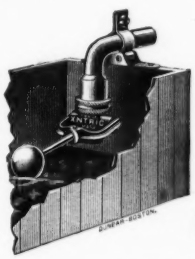
is not affected by water, steam, gas, acids, alkalis, heat or cold Write to-day for free sample.

Wisconsin Graphite Co.

403 Market St., Pittsburg, Pa.

YOU WANT THIS!

As you have been looking for it these many years.



The Xntric Ball Cock

For High or Low Pressure

Notice size of Ball. It is only 3½ inches

Practically noiseless. Guaranteed for two years. There is positively no hammering, and the only one on the market where the valve is closed by water pressure, and which obviates all danger of accident. Been on the market and heartily approved for three years. For use with hot or cold water

SEND POSTAL FOR FLYER TO

Xntric Valve Co.

36 Columbus Ave. Boston, Mass.

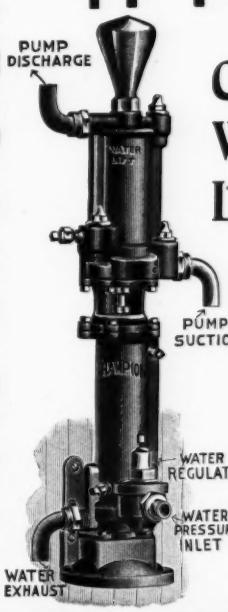
In use in Massachussetts State House and United States Postoffice, Boston.

THE CHAMPION WATER LIFT

IT PAYS

TO PUT IN THE

CHAMPION WATER LIFT



For pumping cistern water or for increasing city pressure it is the BEST.

IT WORKS PERFECTLY.

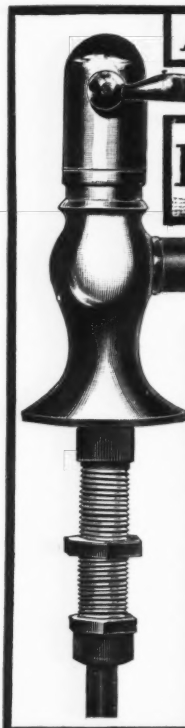
That is our guarantee, and our name is guarantee that the construction is right. Handled by all large jobbers. Write for catalog.

MADE ONLY BY

THE CLEVELAND FAUCET COMPANY

CLEVELAND: 15-27 Frankfort Street.
NEW YORK: 4 Great Jones Street.
CHICAGO: 92 Franklin Street.
SAN FRANCISCO: 202 Ellis Street.

THE CHAMPION WATER LIFT



All first class Plumbers are using the New Style

Broughton Self Closing Basin Cock

NO EXPOSED SURFACES, EASILY KEPT CLEAN

THE BROUGHTON SELF-CLOSING BIBBS & COCKS HAVE BEEN ON THE MARKET SEVERAL YEARS - SUPERIOR TO ALL OTHERS FOR SIMPLICITY AND STRENGTH - EVERY ONE WARRANTED.

Send for Circular and Price List

E. STEBBINS MFG. CO.
SPRINGFIELD MASS.

A GOOD ARGUMENT
IN FAVOR OF THE

Lyons Cocks

More of them sold last year than ever before. We are gratified to know that the trade appreciated our efforts to give them a first class article at a reasonable price. There are none can equal the Lyons Cocks.

MANUFACTURED BY

CLEVELAND BRONZE & BRASS WORKS
CLEVELAND, OHIO

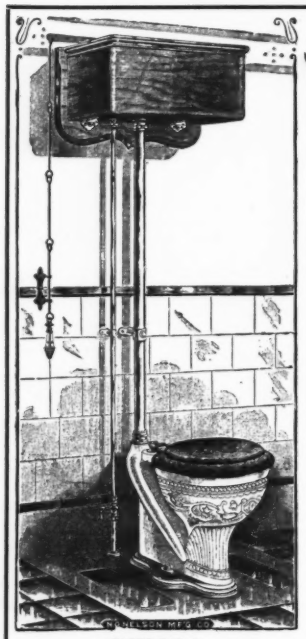


PLATE 315 C

Nelson's

High Grade Syphon Sets.

The New "Dominion"

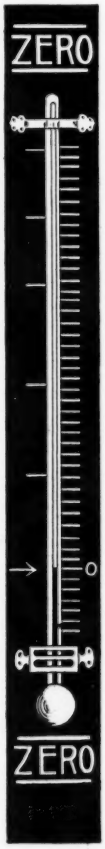
Double Jet
Polished Wood Work
Mechanically Perfect
Absolutely Guaranteed

N. O. Nelson Mfg. Co.
...PLUMBERS' SUPPLIES...
ST. LOUIS, MO.

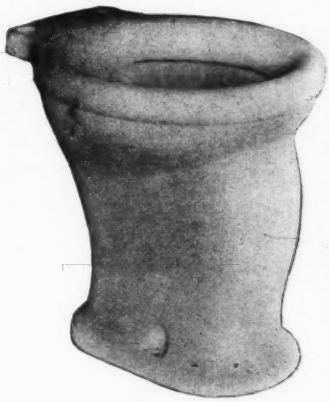
Zero Quick Wasting Hydrant,
Zero Jr. Hydrant,
Zero Self-Closing Hydrant.

Large Wastes, Quick Action, Non-Freezing.
Cheapest and best Hydrants in the world.

Zero Brass & Valve Mfg. Co.
BUFFALO, N. Y.



To the Plumbing Supply Trade:



No. 1. Plain Washdown

This cut represents our new improved plain wash down, which is made with walls one inch thick insuring unusual strength, thereby reducing liability of breakage to a minimum; it is therefore particularly adapted for public buildings, schools or any public place where closets are subjected to hard usage, and is designed to take the place of imported or domestic fire clay closets, and being constructed of a hard vitreous china body it is guaranteed against crazing. We can also furnish these closets with syphonic action or syphon jet.

We manufacture everything in the sanitary earthenware line and pay particular attention to specialties. All closets being tested before leaving our works, we guarantee their working qualities.

Bellmark Pottery Co.

P. O. Box 547. TRENTON, N. J.

THE REEX.

THE KING

of them all.

Syphon Hopper and Trap Combined.

Surpassed by no Closet on the Market.

This closet has **full water ways** through all the **syphon pipes, a large water surface** and 3 inch Seal. It is made for high or low tank . Embossed or plain surface.

Earthenware Specialties designed and finished with unsurpassed art and workmanship.

The Sanitary Earthenware Specialty Company

Trenton, N. J.

R. WILLIAMSON CHAS. E. UMMACH

TELEPHONE MAIN 2220

R. WILLIAMSON & CO.

ACETYLENE GAS FIXTURES AND BURNERS

MANUFACTURERS OF

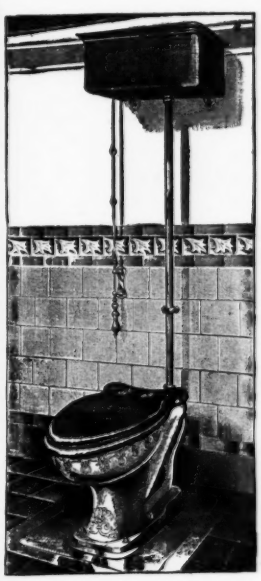
Gas, Electric and Combination Fixtures

AND DEALERS IN

Gas and Electric Globes and Miscellaneous Goods

52 & 54 E. LAKE ST., NEAR STATE

CHICAGO



—THE—

ORINOCO Syphon Jet Closet.

This Orinoco Syphon Jet Closet is what you should have. This is the most perfect and noiseless closet now manufactured. The workmanship and High Grade Finish of the Orinoco Closet cannot be excelled.

IT SPEAKS FOR ITSELF TRY ONE AND BE CONVINCED.

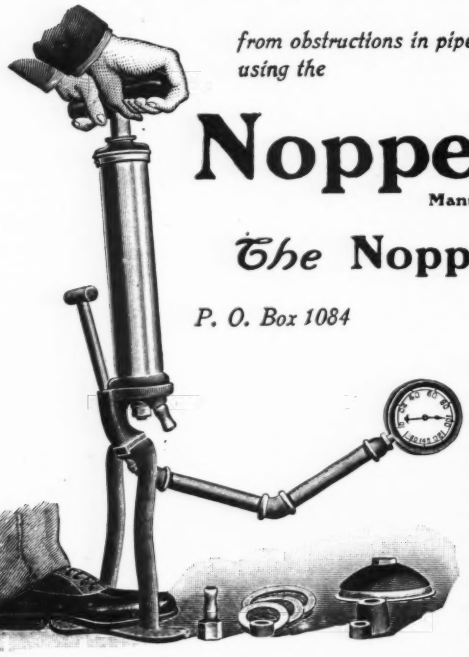
MANUFACTURED BY

THE KING MFG. CO.

LIMITED.

205 Wood Street, Pittsburgh, Pa.

No More Trouble



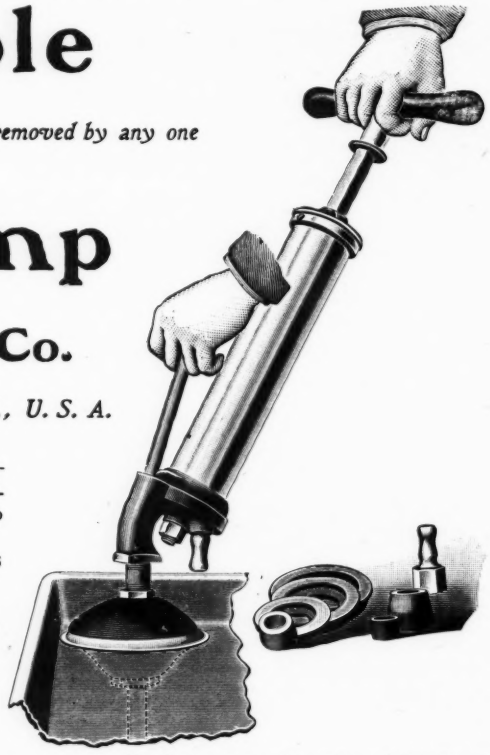
from obstructions in pipes. They can be easily removed by any one using the

Noppel Pump

Manufactured by

The Noppel Pump Co.

P. O. Box 1084 *HARTFORD, CONN., U. S. A.*



This pump is a Combination Lift, Force, Discharge and Test Pump and you can not only force air, liquid or gas into pipes, but can continue to do so, getting an ever increasing pressure. With no alteration in fittings or position of pump you can instantly change from force to suction and continue to exhaust air or draw out and discharge water and loose material. **No Other Pump has these Advantages.**

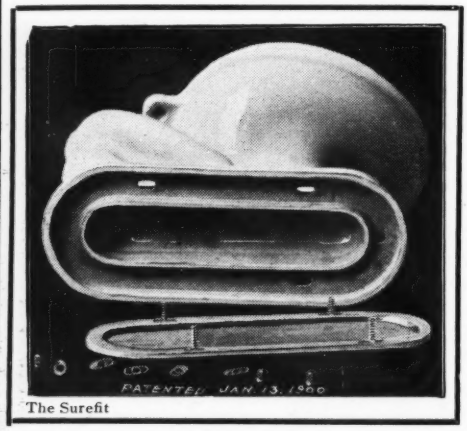
SEND FOR CIRCULAR

INDESTRUCTIBLE **SIMPLE IN CONSTRUCTION** **EASILY OPERATED**

Paste this in the catalogue you use most:

You may not need it to-day, but you certainly will have to have a

SUREFIT



The Surefit

The floor connection is sure to be tight. The first flush tests it. Ask your jobber for price.

The Trenton Potteries Company's goods are sold only through Plumbing Supply Houses.

The Trenton Potteries Company was awarded two grand prizes at the Paris Exposition, in competition with the entire world—a Gold Medal in the Hygienic Department and another in the Department of Ceramics—the Highest Award granted on Sanitary Fixtures and Decorative Ware.

THE TRENTON POTTERIES COMPANY, TRENTON, N.J.

Finest Grades of Sanitary Earthenware and Vitrified China, Solid Porcelain Bath and Laundry Tubs, Sinks, Etc.

Do You Sell Instantaneous Water Heaters? Then

GET IN LINE

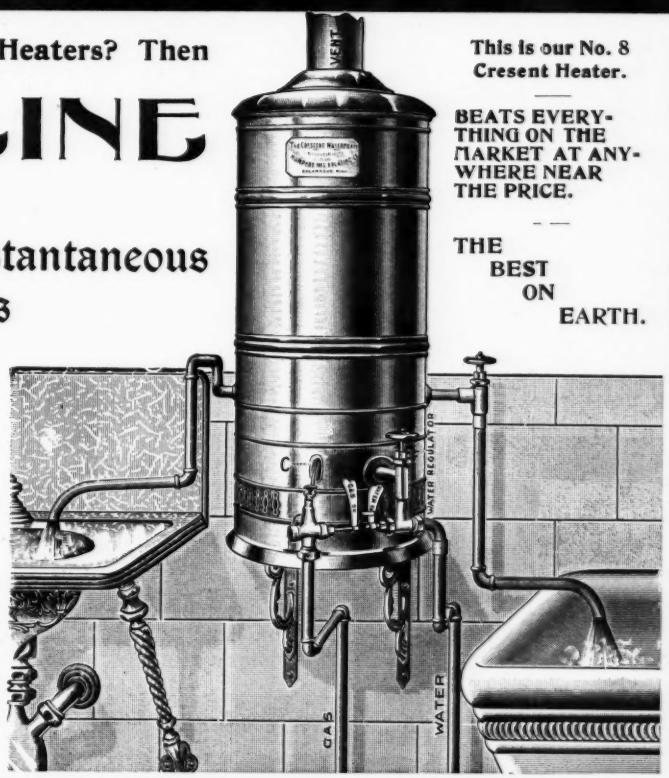
TO PUSH THE

Humphrey Crescent Instantaneous Water Heaters

We guarantee everything exactly as represented. Our prices are the LOWEST. If you cannot sell them, write and we will tell you how to do it and send you our new catalogue.

The Humphrey Mfg. & Plating Co.

KALAMAZOO, MICH., U. S. A.



This is our No. 8 Cresent Heater.

BEATS EVERYTHING ON THE MARKET AT ANYWHERE NEAR THE PRICE.

THE BEST ON EARTH.

DOMESTIC ENGINEERING

IS THE LEADING TRADE JOURNAL DEVOTED TO PLUMBING, HEATING, LIGHTING AND VENTILATING.

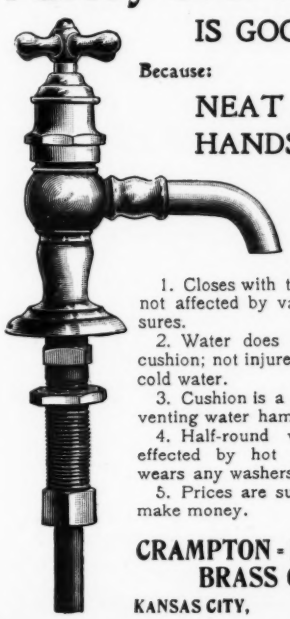
Farley S. G. Work

IS GOOD.

Because:

NEAT AND HANDSOME

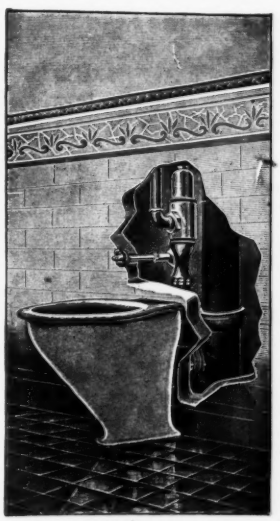
AND



1. Closes with the pressure; not affected by varying pressures.
2. Water does not touch cushion; not injured by hot or cold water.
3. Cushion is a spring; preventing water hammer.
4. Half-round washer not effected by hot water; outwears any washers made.
5. Prices are such that you make money.

CRAMPTON-FARLEY BRASS CO.

KANSAS CITY, MO.



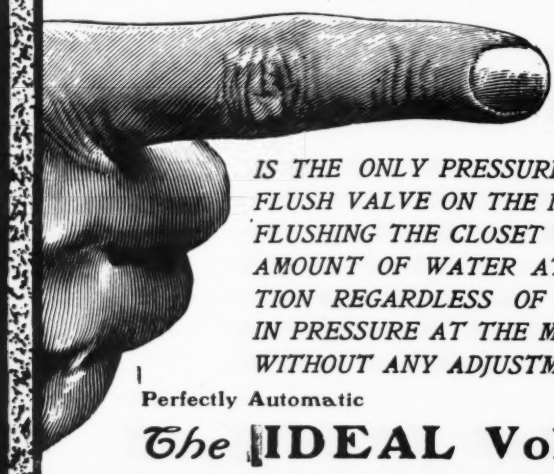
National Enameled Iron Jail Closet

Simple, durable and easily adjusted.
No overhead tanks required. Cannot be tampered with—no movable parts being exposed.

MANUFACTURED BY

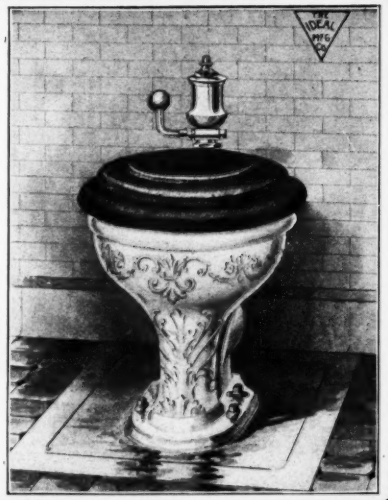
The National Supply Company

TOLEDO, OHIO



THAT

IS THE ONLY PRESSURE REGULATING FLUSH VALVE ON THE MARKET. FLUSHING THE CLOSET WITH THE SAME AMOUNT OF WATER AT EACH OPERATION REGARDLESS OF FLUCTUATIONS IN PRESSURE AT THE MAIN OR SUPPLY WITHOUT ANY ADJUSTMENTS.



Perfectly Automatic Patented

The IDEAL Volumeter

IDEAL MFG. CO. DETROIT MICH.

The IDEAL Mfg. Co.

Manufacturers of

Fine Sanitary Specialties

DETROIT MICH.

GREENAWAY

IDEAL MFG. CO. DETROIT MICH.

The

"Sedate"

We Handle all grades of Low Down Tank outfits, including syphon jet, syphoning hoppers with jets and plain hopper and trap combinations.

We Manufacture the "QUIET" syphon jet and the "SEDATE" syphoning hopper outfits and recommend them to all who desire a thoroughly high grade and highly perfected outfit.

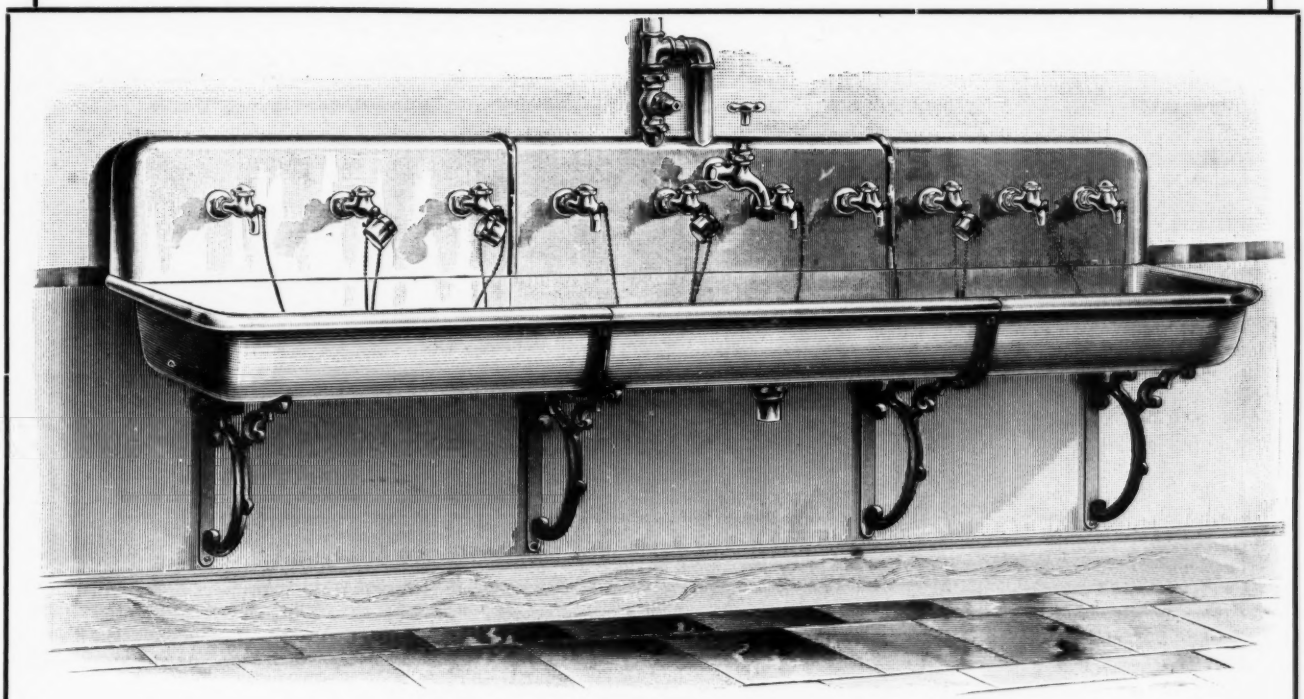
The TANKS, seats and lids are made from carefully selected hard woods, which are highly finished. The "Quiet" and "Sedate" tanks have heavy tinned copper linings and all seams are locked and carefully soldered.

Haines, Jones & Cadbury Company

1128-44 Ridge Avenue
1423 Chestnut Street

Philadelphia, Pa.

Standard Sanitary Specialties



DRINKING FOUNTAIN. PLATE 240 B. D. & M. CATALOGUE.

A FULL LINE OF

Sectional Wash Sinks

Sectional Water Closets

Sectional Lavatories

Sectional Urinals

Suitable for Schools, Factories, Public Buildings, etc. Shown in our Illustrated Catalogues, which will be sent on application.....

Standard Sanitary Manufacturing Co.

PITTSBURG, PA.

Branch Offices: NEW YORK, PHILADELPHIA, CHICAGO, ST. LOUIS, CLEVELAND, MONTREAL

Do You Buy Right?

"Goods well bought are half sold."

You must disarm your competitors. Domestic Engineering's

BUYERS' GUIDE

to manufacturers of Plumbing, Steam and Hot Water Heating Goods, Engineers and Mill Supplies, for 1901, is a necessary book to the careful buyer who wants to get goods from first hands. It contains under each article used in the plumbing and heating business, a complete list of the names and addresses of the firms who manufacture that particular item. Our index shows nearly 1,000 articles are so classified. Would it not pay you to have it always at hand?

Price, $3.00 Delivered

Domestic Engineering

58-64 North Jefferson Street, Chicago, Ill.

THE "GEGENSTROM"

HOT WATER APPARATUS

SCHAFFSTAEDT'S PATENT

FOR THE INSTANTANEOUS
PRODUCTION OF

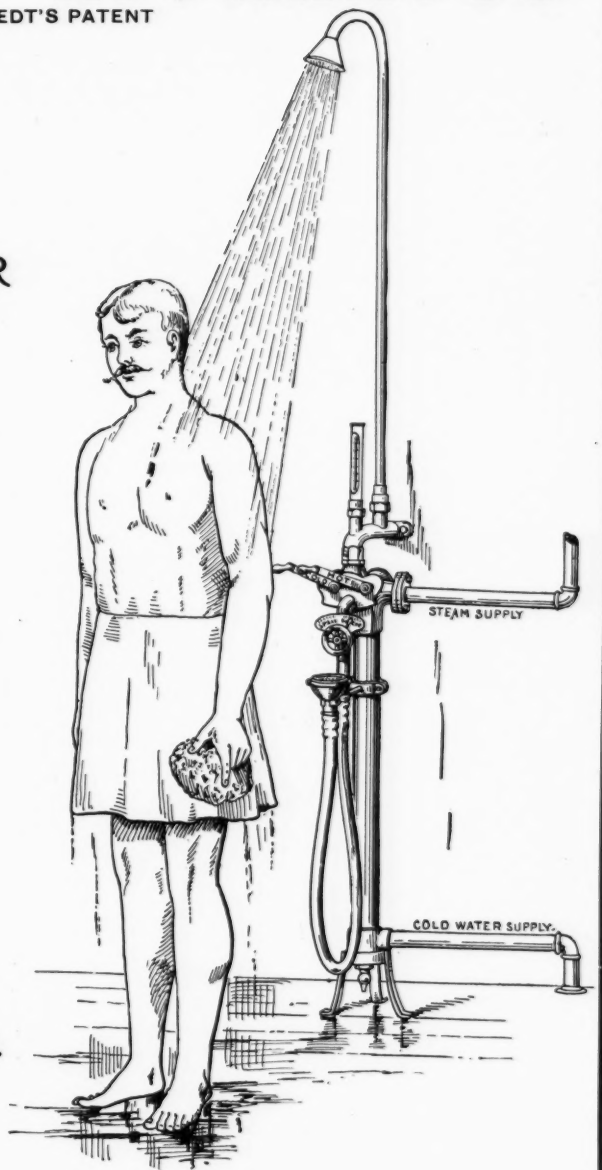
WARM OR HOT WATER

BY MEANS OF STEAM.

ESPECIALLY ADAPTED FOR

RAIN BATHS

IN INSTITUTIONS,
REFORMATORIES
AND PRISONS,
IN HOSPITALS,
INSANE ASYLUMS,
GYMNASIUMS,
ARMORIES.
AND IN
PEOPLE'S BATH ESTABLISHMENTS.



RUNDLE-SPENCE MANUFACTURING COMPANY

THE PEOPLE WHO DESIGN AND MAKE MODERN AND RELIABLE
PLUMBING FIXTURES. (THE GUARANTEED KIND.)

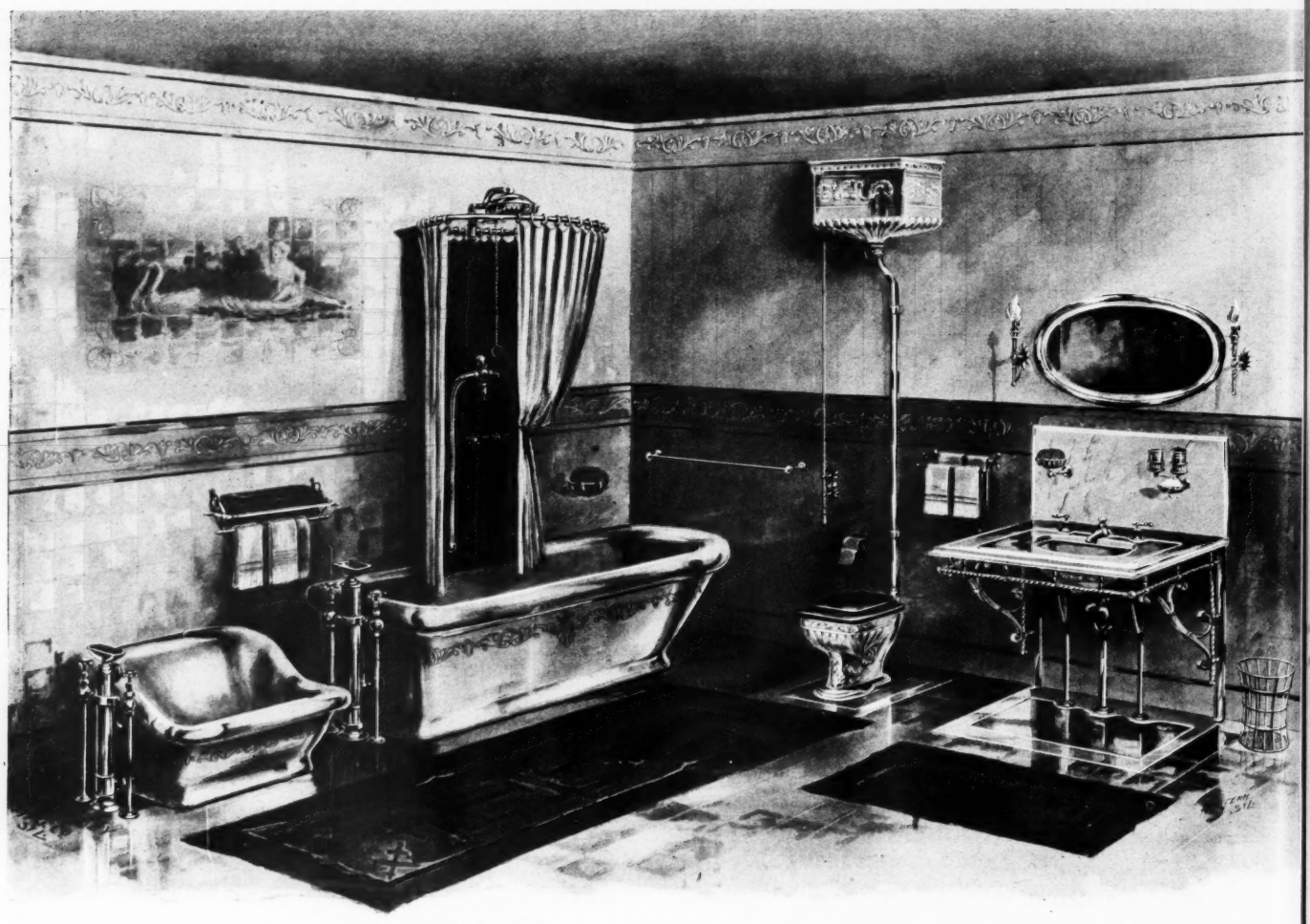
89-91 WISCONSIN STREET
63-67 SECOND STREET
MILWAUKEE

WESTERN AGENTS

52 DEARBORN STREET
CHICAGO

RUMSEY'S "UNA-SEAL"

BATH ROOM COMBINATION, COMPRISING



BATH.—"Una-Seal" Solid Porcelain Roll Rim Bath Tub, 5½ feet long, Class "A," with Porcelain Base to the floor, glazed inside and over Rim, exterior finished Zinc White with "Una-Seal" Decoration, Nickel-plated Low Bell Supply Fitting with Supply Pipes and "Superior" Waste, Nickel-Plated Combination Needle and Shower Bath with Rubber Lined White Curtain.

WATER CLOSET.—Square Embossed "Una-Seal" Syphon Jet Closet (Vitreous Ware) with Mahogany Seat and Cover, No. 25 Embossed Porcelain Syphon Tank, Nickel-Plated Flush and Supply Pipes, Nickel-Plated Rod and Pull Guide and Porcelain Pull. Decoration on Closet and Tank.

LAVATORY.—Italian Marble Lavatory, 34x24 inches with 16-inch Back, 14x19 D-shape Basin, Nickel-Plated "Olympian" Combination Supply and Waste Fixture, Nickel-Plated Supply Pipes, Trap and Ornamental Bracket, Nickel-Plated Soap, Tumbler, Brush and Sponge Holders, and 22x32-inch Plate Glass Mirror with Nickel-Plated Brass Frame.

SITZ BATH.—Solid Porcelain Roll Rim Sitz Bath, Class "A," with Porcelain Base to floor, glazed white inside and outside, with "Una-Seal" Decoration, Bell Supply Fitting with Brass Supply Pipes and "Superior" Waste.

L. M. RUMSEY MANUFACTURING COMPANY

810 North Second Street, St. Louis, Mo.

The JAMES ROBERTSON MANUFACTURING COMPANY

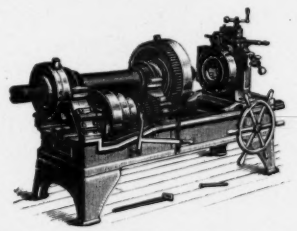
Manufacturers of

Lead Traps — *Enameled Bath Tubs*
Lead Bends — *Lavatories*
Lead Pipe — *Fine Brass Work*
Sheet Lead — *Sanitary Water Closets*
Block Tin Pipe — *Tanks, Seats, Etc.*
Lead and Iron Ferrules.

FACTORY: 827 South Howard St.

Supplies and Tools for Plumbers, Gas and Steam Fitters

OFFICE AND STORE:
30 Hanover St., **BALTIMORE**



Peerless No. 4, Imp. 1 in. to 4 in.

PIPE THREADING AND CUTTING MACHINERY

To Cut from 1-8 inch to 18 inches — HAND OR POWER

Our Machines have Every Improvement for Accurate and Rapid Work.

Bignall & Keeler Mfg. Co., Edwardsville, Ill.

Agents: CHARLES CHURCHILL & CO., Ltd., LONDON. DeFRIES & CO. ACTIENGESELLSCHAFT, DUSSELDORF. AKTIEBOLAGET VERKTYGSMASKINER, STOCKHOLM.

"Repeat it to yourself,
write it down,
do not forget,
but remember,
remember,
remember that advertising is
the news of business,
that good advertising is good
news,
that good news finds listening
ears."

CHARLES MILLAR & SON COMPANY

SELLING AGENTS, UTICA, N. Y.

UTICA PIPE FOUNDRY CO.

CAST IRON PIPE

And Specials for Water and Gas. Wholesale Eastern Agents AKRON VITRIFIED SEWER PIPE.
Flanged Pipe and Fittings, Hydrants, Gates, Pig Lead, Jute, etc.
Manufacturers of Lead Pipe, Solder, etc., and Jobbers of Plumbers' and Tinners' Goods.

"The Cast Sink Must Go"

"Columbus" and "New Era"

Wrought Steel Sinks.

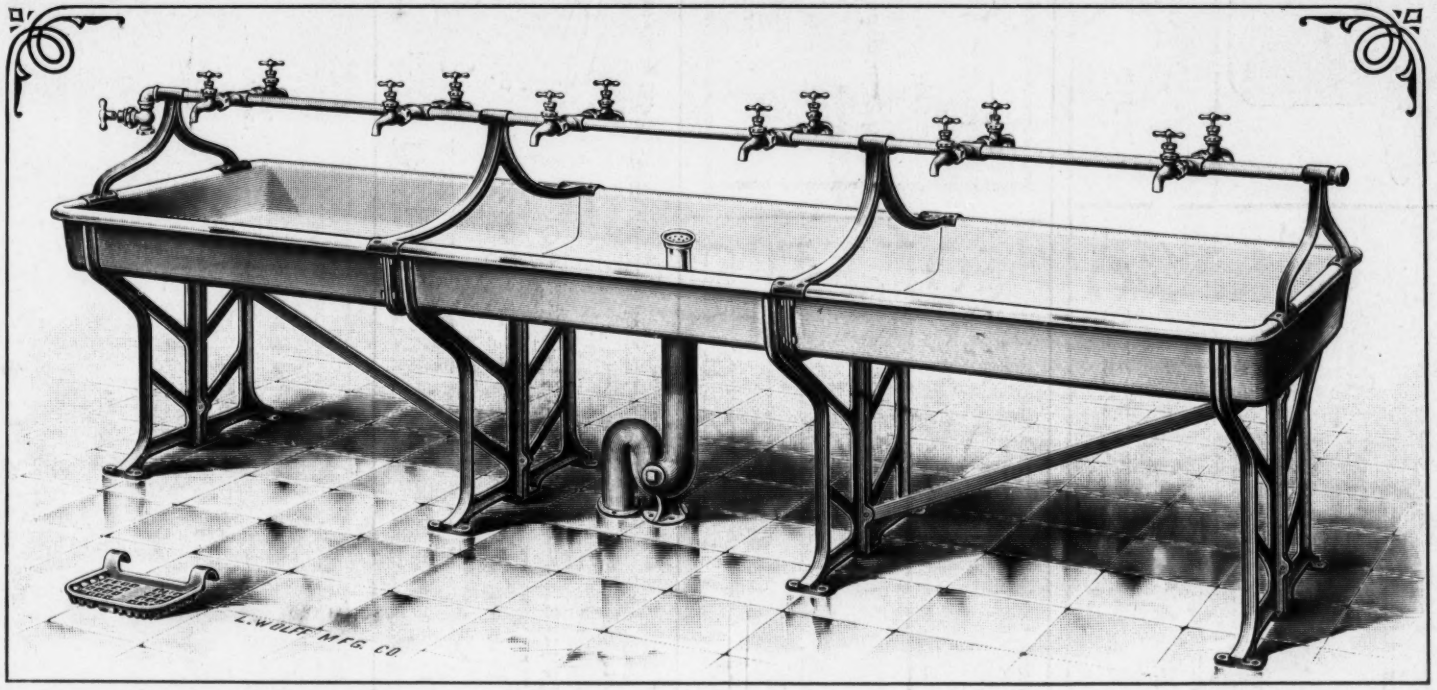
ROLLED RIM AND FLAT EDGES.

Painted, Galvanized, Blue Enameled,
Grey Enameled, White Enameled.

Write for Catalogue and Prices...

The Kilbourne & Jacobs Mfg. Co.,
COLUMBUS, OHIO.

L. WOLFF MANUFACTURING CO., CHICAGO



Enameled Iron Sectional Double Wash Sink, made in sections of five feet long by twenty-four inches wide over rims; fitted with galvanized iron supply pipe with extra pattern compression bibbs; galvanized soap cups, loose key stop, at end, painted iron legs and braces, cast iron trap, with brass standing overflow in sink. The above wash sink is arranged for placing in room so that it can be used on both sides if so desired. It is also furnished with spray pipe perforated entire length, which is placed 3 inches below supply pipe and is utilized for rinsing purposes. A full line of wash sinks of various arrangements are on exhibit at show rooms, 91 Dearborn street.

L. WOLFF MANUFACTURING CO.

Branch: DENVER, COLO. **General Offices, 93 W. Lake Street, CHICAGO.**

OHIO STATE UNIVERSITY LIBRARY